THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. OCTOBER 17, 1895. CHICAGO, ILL. NUMBER 42.

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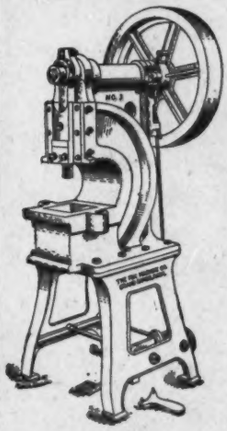

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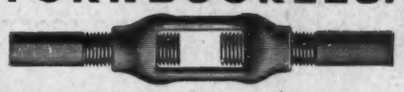

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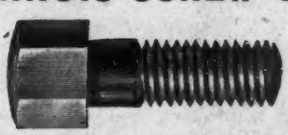

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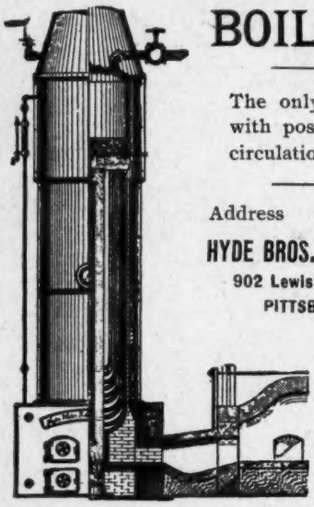

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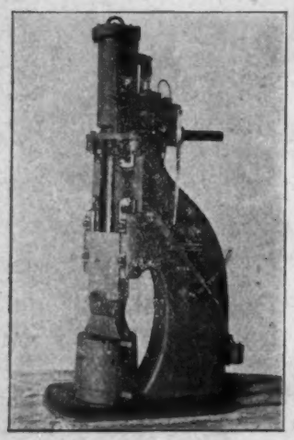

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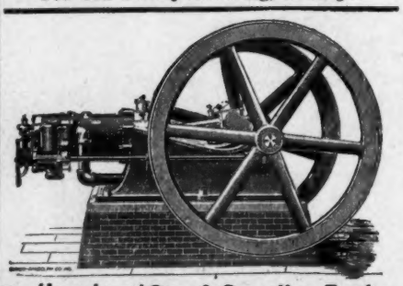

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THE IRON TRADE REVIEW

VOLUME XXVIII. CLEVELAND, O. OCTOBER 17, 1895. CHICAGO, ILL. NUMBER 42.

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

Quietness unequaled in months has marked the iron trade the past week, so far as buying is concerned. At the same time mills are shipping enormous amounts of material and the current output of blast furnaces, all going into immediate consumption, is the largest in three years. While the current rate of pig iron production is equivalent to a yearly output of from 10,500,000 to 11,500,000—according as the Eastern or Western statistics of active furnaces Oct. 1 are taken—there was a net reduction of 43,000 tons in unsold stocks of coke iron, in the month of September. This heavy consumption supports the belief that the wait of the past four weeks is not likely to be greatly prolonged. Furnaces on foundry iron find that their customers want shipments fully up to contract rate and in many cases iron cannot be got to foundry yards fast enough. The withdrawal of so many furnaces from foundry and forge to run on Bessemer has kept the markets for the latter steady in spite of the lull. Only here and there has a transaction been made at a lower price than has been maintained on foundry iron for the past month. Foundry furnacemen consider that the dominating position of Bessemer iron and the weakness in the latter are entirely responsible for the waiting mood of foundrymen whose contracts are fast running out. Lake Superior charcoal is probably the firmest factor in the market. While Lake Superior furnaces have not advanced in unison, and there have been conflicting transactions the probability of higher prices in the coming winter has made sellers quite firm. Sales have been light the past week at $15.50@$16, with several furnaces still holding the latter figure as minimum. Bessemer has sold in small quantities at $14 to $14.50 in the valley, but furnacemen still refuse to take any hand on the basis of the month's sales of speculative iron. It would seem that transactions involving both producer and consumer will not be much longer delayed. Steel billets are following the Bessemer market. Sales in a small way have been made at $21 to $21.25 Wheeling district and at proportional prices in the Pittsburg district. The volume of business in finished material is what might be expected in a period of price adjustment. In the East two or three fair orders for plates and shapes have been taken, the former at 1.75c to 1.80c delivered. Philadelphia prices for mill products are reported to be from one to three-tenths lower than in September. The separate meeting of Western bar iron manufacturers at Pittsburg last week found sentiment agreed that there was nothing in the situation calling for a change of prices, and in other lines the opinion prevails that buying would not be stimulated by lower prices. The issue of the existing uncertainty depends in large measure on the gauge individual producers set on the business to be expected from the railroads in the next three months. Rail deliveries of 850,000 tons to Oct. 1, against 525,000 tons delivered in the first nine months of last year, show that the roads have been contributing not a little to the heavy steel mill output of the past summer. But car buying, especially in the West, has been only a fraction of what the universal car shortage seems to make imperative and for which the great grain movement of the Northwest promises to furnish the means.

THE CLEVELAND DISTRICT.

The rapid ascent of the grain rate the past week put ore shippers out of the market for the most part. A 6c. wheat rate, equivalent to $2.25 for ore, was too tempting to leave any tonnage available for the latter. A few ore charters were made at $1.75 from the head of the lake, but the tonnage involved is insignificant. For Escanaba boats $1.25 was asked in the week with no business done. Later a slight falling off in the demand for wheat tonnage brought the Escanaba rate to $1.10 and several boats were taken. Other shippers, however, have their limit at $1. Marquette shipments have been light. The condition of the freight market will reduce to a minimum the amount of ore brought down on wild charters. Some cases are reported in which unfilled portions of ore contracts are carried over to next season by agreement; but there are other shippers who, even were such an arrangement possible, would prefer to start afresh on the better ore prices of next season. The prospect of large winter shipments from the docks is improving, and next year's business will start on a cleaner basis than has been known in years. There is a noticeable enlargement of mining operations on Lake Superior, and properties idle for several years are getting in line for winter operation. The necessity for concerted action by Bessemer producers is apparent, if this over-stimulus due to higher prices is to be restrained. High lake freights, with the influence they will exert on season charters for '96, coupled with increasing production of ore and late developments in Bessemer pig, make the basis of ore sales for next year a very complex problem.

Pig Iron. Valley furnaces, so far as can be learned, have not receded from their position as to Bessemer pig iron. They are busy on contracts and will be so occupied for from two to four months. Sales have been made below $14.50 in the valley, but the amounts involved are comparatively small. The certainty that the ore supply will not be what has been counted on has confirmed pig iron producers in their position. Foundry irons hold to the former basis of $15 for No. 1 at furnace and $14 to $14.50 for No. 2. Current buying is light, but the output of castings is large and a resumption of buying may be looked for when the position of Bessemer iron is clearly determined.

Finished Material. Both business and inquiries continue light. Some business in structural material is reported in the local market on a basis about $1 a ton lower than was possible two weeks ago, Pittsburg mills having met the minimum of Eastern competitors. Present quotations on beams and channels are 1.60c to 1.65c, Pittsburg, to which a 9c freight additition is made on Cleveland business. One or two plate mills have been willing to go below the price recently maintained and 1.80c Pittsburg, on tank steel has been shaded on several contracts. Bar iron contracts are still waiting. Prices below 1.40c for common iron are heard of, traceable in most cases to dealers who are not producers.

THE CHICAGO OUTLOOK.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

There seems to be a disposition on the part of most of the large consumers of iron and steel to postpone making their purchases of material until the market is a little less sensitive and prices are more settled. One large consumer of billets is quoted to the effect that while he has by no means lost confidence in the market, and fully expects prices to advance before the first of the year, he would rather wait before filling his requirements until he is positive which way the market will turn. This seems to be the feeling generally among buyers. Very little if any speculative trading has been done in this market this year, and in that respect Chicago is in better shape than the Eastern markets. In the past week there have been numerous inquiries for material of all kinds from car manufacturers, and although only a few orders of any size have been placed, it is expected that all or nearly all of the inquiries will result in orders. The furnaces in this territory, with one exception, are all sold up for the balance of this year, and are only accepting orders for such small lots as they can work in. The local mills are running very full, with order books filled to beyond the first of January.

PIG IRON.—Another week of quiet, with small business has closed, and judging from the feeling expressed by both sellers and buyers, there will be light buying for some time. The furnaces with one exception are filled with orders, aud are not willing to take any except for small lots and immediate delivery. The one furnace reported as selling iron under the regular quotations last week has settled down to regular business since then and is now quoting the same figures asked by other makers. Only a small business has been done by the Southern furnaces, and but one or two of these are in shape to accept orders for anything like large lots. Quotations are being firmly maintained. Lake Superior charcoal is in good demand and a few sales of fair size were closed last week. Prices are now made as follows:

Lake Sup. Charcoal	$15 50@16 00	Southern No. 2 Soft	$ @13 90
Local Coke Fdy. No. 1	15 00@ 5 50	South'n Silveries No. 1.	15 25@15 75
Local Coke Fdy. No. 2	14 50@15 00	South'n Silveries No. 2.	@15 15
Local Coke Fdy. No. 3	14 00@14 50	Jackson Co. Silveries	15 50@16 00
Local Scotch Fdy. No. 1.	15 00@15 50	Ohio Silveries No. 1	15 00@15 50
Local Scotch Fdy. No. 2.	14 50@15 00	Ohio Silveries No. 2	14 50@15 00
Local Scotch Fdy. No. 3.	14 00@14 50	Ohio Strong Softeners	15 00@15 50
South'n Coke No. 2	@14 00	Alabama Car Wheel	17 00@17 50
South'n Coke No. 3	@13 65	Malleable Bessemer	
Southern No. 1 Soft	@14 15	Coke Bessemer	

BARS.—There has been a large inquiry from car builders, in lots ranging from 200 to 2,000 tons, and several good sized contracts were closed last week. It is probable other orders will be taken this week. General business has been rather quiet, and prices are firm and unchanged: Common iron, 1.50c to 1.60c; guaranteed iron, 1.60c to 1.65c; soft steel bars from strictly billet stock, 1.65c to 1.75c.

RAILS AND TRACK SUPPLIES.—It has been rumored that the local mills sold large quantities of steel last week, but nothing to confirm the rumor could be found. They report having received a fair amount of business in rails, and that they have inquiries for something over 10,000 tons which will probably develop into orders for delivery this year. None of the Western roads have come into the market for their next years' requirements as yet, and it is early for them to do so. Quotations are unchanged: Rails, $29 and up; splice bars, 1.65c to 1.75c; track bolts, 2.25c to 2.45c; spikes, 1.95c to 2c.

BILLETS AND RODS.—The market is quiet, with no business of any magnitude closed in the past week. Prices are maintained at $26 to $27 for billets and $34 to $35 for rods.

STRUCTURAL MATERIAL.—The material for the new library at Milwaukee, amounting to 700 tons, will probably be placed this week. There has been a large demand from car builders for steel shapes, and several good orders have been booked, with others about to be closed. Quotations are firm and unchanged. Beams and channels, 1.90c to 2c; angles, 1.85c to 1.90c; plates, 2.10c to 2.20c; tees, 2c to 2.10c. Small lots from stock are ¼ to ½c higher.

PLATES.—The market has been quiet, and the week's business foots up a fair total, nearly all in small lots. Prices are firm, as follows: Tank steel, 2c to 2.10c; flange steel, 2.20c to 2.30c; firebox steel, 2.85c to 5c; boiler tubes, 60 to 65 per cent discount.

MERCHANT STEEL.—The week has been rather quieter, and only a few small contracts were closed. Prices are firmly maintained. Open-hearth spring, tire and machinery steel, 2.20c to 2.25c; smooth finished machinery steel, 1.95c to 2c; smooth finished tire, 1.90c to 1.95c; tool steel, 5.50c to 7.50c; specials, 11c and upwards; Bessemer bars, 1.65c to 1.75c.

SHEETS.—Mill orders are not so frequent but a good store business has been done in small lots. Quotations are made at 2 90c for No. 27 common iron, and 3c to 3.05c for sheet steel. Galvanized sheets are quoted at 75 to 75 and 5 per cent discount.

OLD RAILS AND WHEELS.—Old iron rails are in quiet call, and are a little easier at $18 to $18.50. Buyers as a rule decline to pay this for them, and offers have been made of $17 and less. Old steel rails are in light demand at $13.50 to $15, according to length, etc. No sales of old wheels are reported, and they are quoted at $13.25 to $13.75.

SCRAP.—Prices are a little lower, and at the present quotations a little buying has been done. Railroad forge, $14.50; dealer's forge, $12 to $12.50; No. 1 mill, $9.50; heavy cast, $9.50; axles, $16.50; cast borings, $6; wrought turnings, $7.75; axle turnings, $8.25; mixed steel, $10.50 to $11; stove plates, $7.50; heavy melting steel, $11.25 to $11.75.

IN OTHER MARKETS.

[SPECIALLY REPORTED FOR THE IRON TRADE REVIEW.]

Pittsburg. All hands are watching the market closely, but the wait for developments continues. Producers seem still content to let middlemen have possession of what little market there is and meantime are not seeking to take the initiative. It is the general belief that the weeks of inactivity that began in mid-September are nearing an end and that the later fall will bring a renewal of buying. But the weakness that has developed meantime encourages further waiting; and it would look as though the pace for a new buying movement must be set by strong concerns. Pig iron sales have been light in the past week. Some Bessemer iron has been sold at $14.50 valley furnace—one transaction of 1,000 tons at that figure is reported; and at $14.75, valley, a sale of 3,000 tons and one of 1,500 tons have been made. There are reports that these figures have been shaded, and $14.25 and $14 have been named as possibilities. Furnacemen have not changed their quotations, so far as we have learned, and $16 in the valley is their bid for deliveries after Jan. 1. It is apparently a test of endurance, with two and a half months' business, and in some cases four and five months' business ahead, in the hands of Bessemer producing furnaces. The foundry iron market holds much steadier than Bessemer, but the influenec of the lower price in the latter has been seen in the dispos-

ition of foundrymen to hold aloof from the market, though many of them are getting to the end of their contracts and are asking for shipments faster, in some cases, than the furnaces can supply them. Forge iron is weaker, in sympathy with Bessemer. A sale of 500 tons at $12.50 valley is reported, and $13 Pittsburg has been done. Steel is very inactive. Though most of the mills have contracts on their books for a considerable portion of their production in the balance of the year, they find it difficult to obtain specifications and thus have some material to sell for quick shipment. We note a sale of 1,000 tons at $21.25, one of 1,500 tons at $21.15 and one of 500 tons at $21, all f. o. b. mill in Wheeling district. The Pittsburg market is probably $21.50 to $21.75. In finished material current demand is light. A good deal has been anticipated from railroad orders, and the car scarcity of the past few weeks has been expected to bear fruit. The Pennsylvania road has placed an order for 1,000 gondola cars. Bar iron sales are of only moderate volume. Some dealers, who have iron coming to them on low priced contracts are shading 1.40c for common iron. Structural mills are running on old orders, but are not so well engaged for the future. We quote 1.60c@1.65c on beams and channels, and 1.55c@1.60c on angles. Wrought pipe mills are busy and orders are coming in steadily. The discounts announced three weeks ago are adhered to. On tank plates the ordinary quotation is 1.80c@1.90c but the lower figure is known to have been shaded. In old material prices are easier. Small sales of old steel rails have been made at $15.50 and of old iron rails at $18.75 and $19. No. 1 railroad wrought scrap is quoted at $15 and short wrought scrap at $13. Connellsville coke production is maintained at a record-breaking rate. For the week ending Oct. 5 the 15,561 active ovens had an estimated output of 166,200 tons. Shipments were 8,695 cars, or 308 cars less than for the preceding week.

Buffalo. The iron market generally is firm at last week's quotations. So many malleable and car wheel works have taken in their entire winter's supply of pig iron, both charcoal and coke, that unsold stocks of Lake Superior charcoal at lake ports have been about cleaned up. There is not the slightest disposition on the part of charcoal furnaces to cut present prices of that class of metal, but Bessemer has been offered and readily sold at a price under last week's sales. It remains to be seen whether the clearing up of these lots will stiffen the market. Locally, some soft Southern iron has been sold under the market price, but this has been iron from warrant yards, and we are given to understand that these odd lots have been about exhausted. Northern furnaces are suffering from the lack of cars in the coke region, and three Southern furnaces have had to stop this week because they could not get cars enough to carry ore from the mines to the furnaces.

Cincinnati. The decline in Bessemer pig iron has had an impression on all other classes of iron, and imparted considerable weakness to the pig iron market in general. While a comparatively small amount of speculative and storage warrant iron had accumulated, the holders were influenced by the action of Bessemer and some of these lots were put into the hands of numerous brokers to sell, and they have been offered freely and widely until the insignificant quantity was largely magnified, and emphasized the somewhat demoralized condition occasioned by the Bessemer reaction. There has been a steady increase of production, but it has been healthy and the consumption of ordinary coke, foundry and mill grades has more than kept pace with the furnace output, for there are proofs of a continued reduction of stocks of pig iron. The blowing in of the Embreeville, Roanoke and Max Meadows is timely, as their supply will be needed to offset the general curtailment the winter season invariably brings. The comparatively quiet market prevailing the past week is not necessarily an evidence of permanent weakness or decline, "off lots" and "job lots" always appear on the market at such periods. A few furnaces are obliged to sell as they make, and slight concessions in such cases on a buoyant market are unobserved, but at the moment excite comment. There is an improvement in general business, the market is in good form and it is believed a good business will be done before the holidays. Pig iron markets abroad are higher and firm.

CONDITION OF BLAST FURNACES OF U. S.*

Oct. 1, 1895.

Location of Furnaces.	Charcoal.					Bituminous or Coke.				
	Total No. of Stacks.	In Blast.		Out of Blast.		Total No. of Stacks.	In Blast.		Out of Blast.	
		Number.	Weekly capacity.	Number.	Weekly capacity.		Number.	Weekly capacity.	Number.	Weekly capacity.
New England	11	2	239	9	829	.....	.....	.....	.....	.....
New York	6	1	94	5	637	5	2	2983	3	3335
Pennsylvania	13	2	118	11	865	5	3	2960	2	1440
Pittsburgh	.....	.....	.....	.....	.....	24	24	44902	.....	.....
Spiegel	.....	.....	.....	.....	.....	2	2	2064	.....	.....
Shenango Valley	.....	.....	.....	.....	.....	16	14	17361	2	1361
Jun. and Con. Vals	.....	.....	.....	.....	.....	17	9	10512	8	3210
Maryland	4	.....	.....	4	310	5	.....	.....	5	5955
Virginia	4	.....	.....	4	210	23	13	8594	10	5431
North Carolina	.....	.....	.....	.....	.....	2	.....	.....	2	745
West Virginia	.....	.....	.....	.....	.....	4	3	3574	1	260
Ohio—Mahoning Val	.....	.....	.....	.....	.....	12	8	10383	4	5872
East, Cent. & North	.....	.....	.....	.....	.....	17	14	16919	3	4005
Hocking Valley	.....	.....	.....	.....	.....	6	1	857	5	1749
Hanging Rock	10	5	432	5	430	11	7	1862	4	1285
Kentucky	3	.....	.....	3	865	6	4	1700	2	880
Tennessee	8	1	135	7	2210	13	5	5026	8	4660
Georgia	3	1	282	2	375	2	1	620	1	740
Alabama	12	3	764	9	2050	39	19	18786	20	12335
Indiana	.....	.....	.....	.....	.....	2	.....	.....	2	275
Illinois	.....	.....	.....	.....	.....	19	15	24865	4	4945
Michigan	20	5	1777	15	4919	.....	.....	.....	.....	.....
Wisconsin	4	2	1220	2	445	4	3	2789	1	700
Minnesota	.....	.....	.....	.....	.....	1	.....	.....	1	665
Missouri	2	.....	.....	2	580	3	1	1050	2	1425
Texas	4	.....	.....	4	985	.....	.....	.....	.....	.....
Oregon	1	.....	.....	1	280	.....	.....	.....	.....	.....
Colorado	.....	.....	.....	.....	.....	3	1	1000	2	1598
Total (char. and coke)	105	22	5061	83	15990	241	149	178798	92	62541
Total anthracite (New York, New Jersey, and Lehigh, Schuylkill, Upper and Lower Susquehanna and Lebanon valleys.)	126	56	35799	70	28827	.....	.....	.....	.....	.....

SUMMARY.

Fuel.	In Blast.						Out of Blast.			
	Number.			Weekly Capacity.			Number.		Weekly Capacity.	
		Month Previous.	Year Previous.		Month Previous.	Year Previous.		Month Previous.		Month Previous.
Charcoal	22	21	21	5,061	4,689	4,601	83	84	15,990	16,313
Anthracite	56	49	31	35,799	31,744	18,537	70	78	28,828	32,241
Bituminous	149	149	119	178,798	176,057	135,429	92	92	62,541	62,784
Total	227	219	171	219,658	212,490	158,567	245	254	107,358	111,338

*The above table is condensed from the *American Manufacturer*. The tables of the *Iron Age* show in blast Oct. 1, 23 charcoal furnaces, with 4 598 tons weekly capacity, instead of 5,061; 206 coke and anthracite, with 196,816 tons weekly capacity, instead of 205 (adding together "bituminous" and anthracite in above), with 214,597 tons weekly capacity. Total 229 active furnaces, with a total capacity of 201,414 tons, instead of 219,658 as above.

The American Engineer and Railroad Journal, which, with M. N. Forney as editor and proprietor, has held a high place in engineering literature, will be published bi-weekly instead of monthly, beginning with Nov. 1. More frequent appearance, it is believed, will add to the freshness and value of matter and keep the journal more closely in line with current topics in mechanical and railroad engineering.

THE IRON TRADE REVIEW

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IMPORTS AND EXPORTS OF IRON.

August statistics of the import and export trade of the United States in iron and steel are at hand and contain several interesting features. Iron ore imports, as is well known, have increased materially over those of last year. In August, 51,745 tons came in at Atlantic ports, against 18,767 in August 1894. The total in 1895 to Sept. 1 was 236,114 tons; in the same period last year, 93,144 tons. Pig iron imports are increasing slightly, as the table below shows, though the total for neither year is of any significance. The cutting off of black plate imports for dipping appears in the statistics for sheets—a total of 5,047 tons in August last year; this year only 670 tons in August. For the first eight months the total of sheets of all descriptions was 20,282 and 10,334 tons in 1894 and 1895 respectively, a large part of the falling off being no doubt attributable to the lessened dipping of imported black plates. Tin plate imports, for reasons which are well known, have increased over last year. The figures in detail are as follows:

IMPORTS OF IRON AND STEEL FOR AUGUST AND EIGHT MONTHS ENDING AUG. 31, 1894-5.—GROSS TONS.

	August.		Jan.-Aug.	
	1895.	1894.	1895.	1894.
Pig iron	2,818	1 019	13 777	10,163
Scrap iron and steel	721	1	1,895	1,236
Bar iron	2,057	944	10,103	3 755
Rails	587	.....	589	486
Hoops and ties	.....	.....	50	.....
Hoop and band iron	.....	91	1	804
Ingots, blooms, billets, etc	2 623	394	11,837	4,349
Sheets and plates	670	5,047	10,334	20,282
Cotton ties	974	.....	1,373	.....
Tin plates	17,893	14,664	154,182	137,232
Wire rods	2,948	1,485	15,361	14,076
Wire and wire rope	433	405	4,245	2 641
	30,854	24,050	223 747	195,024

The export side of the sheet for August is, as always, insignificant, so far as the cruder forms of iron and steel are concerned. The total of exported machinery is $1,399,115 as compared with $1,205,595 in August, 1895; for the eight months ending Aug. 31, 1895, it is $8,943,037 compared with $7,333,727 in the corresponding eight months last year. Builders' hardware to the amount of $3,054,665 was exported to Sept. 1, this year, against $2,999,475 in the first eight months of 1894. The total exports of iron and steel and their manufactures to Sept. 1 were valued at $21,952,642, as against $18,642,211 in the like period of 1894.

RAILROAD CAR NEEDS.

Railroad earnings in September were 4.2 per cent larger than in the same month last year for the roads reporting, but 10.8 per cent less than in 1892. The record month by month this year has shown practically the same slight ratio of increase. That there is an increase is good; that it is so slight is not so promising for the great volume of buying for which the iron and steel trades are looking to the railroads. Yet there is another side to the story—the equipment needs of the railroads, which have been growing more and more urgent with every week. Lack of cars has been a serious handicap to many industries. The Connellsville coke companies have been crippled because cars could not be had as needed; coal shippers East and West have complained loudly; lake commerce has been interfered with; blast furnaces in the South have had trouble getting regular supplies of raw materials; blast furnaces in all sections have been hampered in filling the orders of mills and foundries for the same reason; and now the roads of the West and Northwest are scrambling for cars to move the tremendous crops that bid fair to overwhelm them in the next few months. Thus it would appear that the present car shortage is not the result of a spurt of traffic incident to the closing weeks of the navigation season, or to the demands of a single industry or section, but is a condition growing out of the policy the railroads have followed in the past two and a half years. The *Railroad Gazette* comments on the subject as follows, taking for its text the complaints of iron and steel interests at Pittsburg, that the railroads have not been able to bring ore fast enough from docks to furnace yards:

This "car famine" is one phase of the widespread change that is being effected in the general industrial situation, in conformity to which every merchant and manufacturer prepares himself as far as possible to meet large demands in short time. Competition is so sharp and so nearly equal that the bidder making the earliest delivery get the best contracts in a great many lines. Buildings and machinery are so *comparatively* cheap that abundant capital provides manufacturing facilities far beyond the *average* requirement. Workmen are so plenty that extra men, to promptly execute every order received, are easily gathered. With these favorable conditions the manufacturers of a given district, or in a certain line of goods, can procure enough in four or six months to meet the demand of 12 months; and, as a matter of course, they would like to have the railroads keep pace with them, to the extent of furnishing a supply of cars and engines sufficient to haul 12 months' freight in four months. The roads do not do this (although they often go farther, in the attempt to meet the conditions, than an ideal economy would allow), and so, in the general attempt to rush business, the transportation element is the first link of the chain to prove inadequate. There are reasons enough why this should be so. The railroads have severe limitations which compel them to take constant care not to provide facilities beyond the actual requirements of their customers. Omitting mention of details of construction and other mechanical items which cannot be compared with similar features in other business, on any intelligible basis, the danger that the public may permit the construction of a new road or may arbitrarily reduce rates, is sufficient to chill nearly every idea, looking to expansion of faculties, that may enter a manager's head. The railroad that builds cars much beyond the requirements of the shippers whose business it is sure of, plus the average requirements of competitive business, is pursuing a bold policy. The risk is such as to offset a number of the big dividends that legislators complain of.

We believe the lack of cars that is now harrassing shippers is due to a cause of less permanent character than that pointed out in the above. The manufacturing capacity of the country has been for many years capable

of an output in excess of average consumption. The same has been true of the transportation facilities. There have been more railroads than the traffic of the country required. But while the manufacturing capacity of the country has remained practically the same through the recent depression, it is well known that the facilities of the railroads for handling traffic have been greatly reduced through the retirement of equipment that could no longer run safely. The process has gone on until a car supply proportioned to a year of scant crops is found in the West, and in other sections increasing production in all lines has crowded upon the railroads far more rapidly than the limited orders for new cars have supplemented the much impaired equipment of two years of starvation buying.

There are signs of an adjustment to the larger requirements of 1895, and the iron trade has a double interest in the new policy. It means new orders for the mills and freer shipments in all departments of the trade.

Personal.

Robert Bentley, manager of the Mary furnace at Lowellville, O, was married, Oct. 16, to Miss F. Augusta Zug, at Carlisle, Pa.

Willard S. Pope, president of the Detroit Bridge & Iron Works, died at Detroit, Oct. 10, aged 63. His reputation as a designer and builder of bridges was national, and he was often employed as referee in questions of railroad construction. His literary abilities were of a high order.

S. W. Richards has resigned as superintendent of the Sharon, Pa., plant of the American Steel Casting Co.

John L. Stevenson, engineer and superintendent of the Ironton Structural Steel Co., West Duluth, Minn., has gone to Europe in the interest of his company.

Andrew Carnegie arrived at New York, Saturday, Oct. 12, after a six months' sojourn in Europe. He went to Pittsburg early in the present week.

Matthew Forker, of the Alabama Rolling Mill Co., Birmingham, Ala., and Miss Anna Dickson McClure, daughter of Samuel McClure, manager of the Stewart Iron Co., Sharon, Pa., were united in marriage Oct. 16.

Stewart H. Chisholm, president of the HP Nail Co., Cleveland, has returned from a summer's stay in Europe.

Eugene Langen, one of the millionaires of Cologne, and a director of the Otto Gas Engine Works, of Philadelphia, died Oct. 2, of heart failure, at his country seat, Elsdorf, near Cologne. Mr. Langen was one of the largest beet sugar manufacturers in the world, acquiring by that business about $20,000,000. Beside this he had a large business, and was a director of the Gas Moteren Fabrik Deutz, the largest of its kind in Germany. He had many decorations conferred upon him for his ingenuity and enterprise, one being from Emperor William I. He was only once in the United States, in 1894, when the firm of Schleicher, Schumm & Co. ceased to exist, and the Otto Gas Engine Works were incorporated. He was about 60 years old. Twelve children survive him, one of whom, Mr. Gustave Langen, is president of the above firm.

England Seeking Rail Business Here.

Rail mills in England have had a somewhat better time of it lately, at least there is an advance in price. There is some figuring, moreover, on orders from the United States, according to the paragraph below, which we reprint from a London exchange, but the advance abroad would seem to put an end to any chances of shipment into this country that may have existed a short time ago: "A large business has recently been done by steel-rail makers, and there has been a rapid rise in prices, some firms having secured 20s. per ton more for heavy rails this week than they could get in the early part of the year, there having been business done at £4 5s. per ton net at works in the north of England, and that is being quoted now, as the works are more fully employed than they have been for several years. Inquiries have lately been received from the United States for supplies of rails, as the mills over there are said to be overpressed with work, and it is difficult, according to the American papers, to get requirements satisfied within reasonable time. With a view, it is said, of negotiating for some of these orders, a leading official of one of the north-country rail manufacturing firms has been sent over to the United States. At the same time he will visit some of the principal works, and particularly blast furnaces, to study the question of the large outputs that are obtained there. At the Carnegie furnaces as much as 3,000 tons of pig iron are produced per week in some of the furnaces, which is just double what the best of our hematite furnaces produce; indeed, 1,200 tons is a very good output for our furnaces. But at Pittsburg they use an ore containing 60 per cent of metallic iron, where our ore has only 50 per cent, and besides this they blow a 10-pound pillar of blast against our 5½ pound, but these circumstances will hardly account for the extraordinary outputs."

ROGERS, BROWN & CO. announce, under date of Oct. 5, that they have made a change in the personnel and location of their Chicago office. M. C. Armour, who has been a member of the firm at Cincinnati for the past five years, and who before then was a Chicago man, having at one time been connected with the Adams & Westlake Co., of Chicago, has removed from Cincinnati to Chicago, and will remain there as resident partner. The addition of the Calumet Furnace Co. agency to the already large business of the firm, has decided them to make the Chicago house independent and local in every respect, save as it enjoys the benefit of connection with the firm's interests in other parts of the country. Three other experienced men, besides Mr. Armour, will be added, but Mr. Frank I. Foote and Mr. E. L. Billingslea will have charge of the sales as heretofore. The firm has been compelled to move into more commodious offices because of the changes and of their larger business, and can be found in rooms 1629 and 1630 Monadnock Block. After Oct. 15 all invoicing, collecting and detail of correspondence with furnaces, coke ovens, etc., will be done direct from this office instead of through the Cincinnati office.

THE fifth International Congress for the Unification of Methods of Testing Materials of Construction was held at Zurich, Switzerland, Sept. 9-11. The United States Government was represented by Capt. O. M. Carter, U. S. A. corps of engineers, and the American Society of Mechanical Engineers by Gus. C. Heuning. The latter made an address giving a resume of the work done by the A. S. M. E. committee on standard methods of testing materials. The speaker used large charts prepared to show relative strength of cast iron and cooling curves of metals in the way that these subjects were presented at Detroit in June, 1895. The results of the experiments that led to the presentation of Keep's cooling curves at Detroit were received with much interest.

THE Manufacturers' Advertising Bureau and Press Agency, of New York, founded in 1879 by Benj. R. Western, is to-day more successful and influential than at any time in its history. Mr. Western's experience in trade journalism, beginning with the establishment of the *Engineering and Mining Journal* in 1866, make his work for his clients especially effective. Jos. H. Williamson, manager of the bureau, has been associated with Mr. Western for a number of years, and his long experience in advertising has been no small factor in the success that has been achieved. W. Hull Western is in charge of the press department of the bureau, and has proved a capable assistant to advertisers with noteworthy installations or new devices in machinery, that merit attention in the news columns of trade journals.

Hardware prints the opinions of the leading bicycle manufacturers of the country as to the number of bicycles manufactured in the United States in 1895, and the probable output for 1896. The responses place the output for 1895 anywhere from 400,000 to 750,000, and of 1896 from 600,000 to 1,000,000. The fear is expressed by some manufacturers that the business will be overdone, more especially in the cheaper grades, although production will be restricted somewhat by the inability to obtain material. No fear is expressed of there being any falling off in the demand because of waning interest in the use of bicycles.

LONG COAL CAR DUMPER.

Apparatus for the rapid and economical handling of coal at lake docks, with a minimum of breakage has been the desideratum of the large coal shipping interests for years. In the past two seasons experiments have been carried on with two or three machines that promise to be prominent factors in the lake coal trade. One of these, for which the claim of preeminence is made, on the score of speed and convenience, is the Long car dumping machine, the invention of Timothy Long, of the Long Mfg. Co., Cleveland. His apparatus, of which views are given in the engravings, is being operated at the N. Y., P. & O. coal dock, Cleveland, by the Erie Coal Transfer Co., whose offices are connected with the well-known coal firms of Osborne, Seager & Co., Walsh, Upstill & Co., and Morgan, Moore & Baine. Mr. Long has designed a number of improvements in coal handling machinery, including a patent bottom-dump coal bucket and a steam clam-shell bucket.

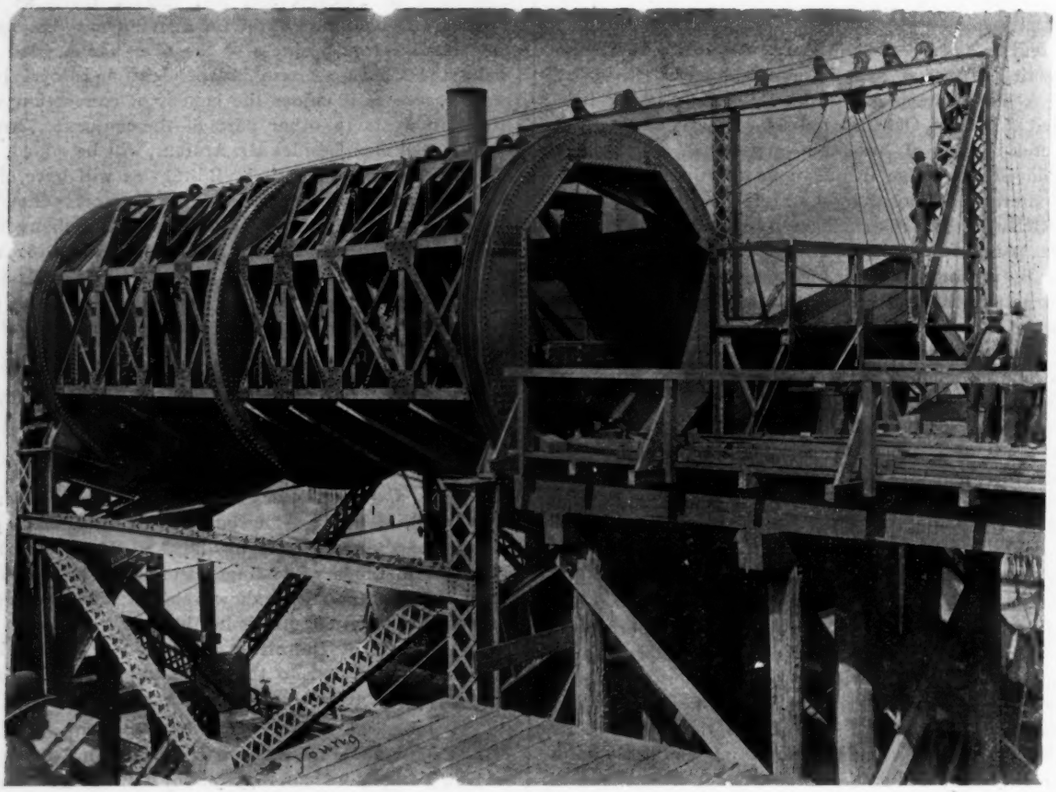
The Erie Coal Transfer Co. has a trestle which will hold 55 loaded and 70 empty cars on a level with the coal dumper, and as quick as cars are emptied it can send them on direct to the ore docks to get return loads. The trestle is connected directly with the tracks of the Pittsburg & Lake Erie and the New York, Lake Erie & Western roads.

The main portion of the apparatus, shown in the illustrations, is a stiffly braced steel cylindrical skeleton, weighing 40 tons empty, or 80 tons when containing a car. The cylinder is 40 feet long, with an external diameter of 16 feet and a clear internal diameter of 11 feet. Situated on a level with the trestle already referred to, the cylinder contains a section of track on to which any car from five to eight feet high may be shifted. As soon as the loaded car is in position in the cylinder, the side toward the vessel into which its contents are to be dumped is clamped by a hydraulic buffer arrangement instantaneously worked with a lever, while the first movements of the cylinder releases four pairs of automatic clamps, each pair weighing a ton, which jam down upon top of the car sides. The cylinder is shown at rest in the first cut. At the rear end of the cylinder it will be seen that there is a small platform raised four or five feet above the rail level. Standing on this platform one man regulates the movements of the dumper by the five foot lever shown just to the right of the cylinder end. By the movement of this lever, a direct pull of 40,000 pounds, enough to do the necessary work is applied to the cylinder, which thereupon rolls up tracks, at a grade of about one in six, provided at its either end. On the tracks are conical cast steel pins which engage with four-inch holes in the circumference of the cylinder to serve as guides to assure the correctness of its motion. The cylinder traverses some 17 feet of track, and with that amount of movement the car side is turned over to an angle of about 45 degrees. At this point a lip of the cylinder is brought down upon the hopper which is inclined at 40 degrees.

The hopper is fan-shaped, 36 feet wide at the top and 24 feet long, tapering down to the width of two chutes. It will hold the largest car load of coal, independently of the chutes which may be kept horizontal while the car is dumped, while they may be lowered later into the hold of the vessel, thus allowing the coal to be discharged gently in a body and reducing the breakage to a minimum.

Records of dumping already made are 58 cars in 4½ hours; 5 cars in 11 minutes, and 70 cars in 5 hours. The time really occupied in the process of dumping a car is only 10 seconds, so that in regular operation it is expected that an all-day average of 15 to 20 cars an hour will be readily maintained.

Power is obtained from two 70 horse power boilers on the dock level, which works two capstans besides the car cylinder and the chutes. From the dock level to the car track is 26 feet, to the upper end of the 38-foot panel occupied by the inclined cylinder track is 32 feet, and the height to the top of the cross-beam supporting pulleys to hoist the chute is 48 feet 6 inches. The beam, which forms the front portion of the whole steel frame work is supported by three columns spaced 18 feet apart, giving a total width of 36 feet. The weight of framework, cylinder, boiler and the whole outfit combined is about 170 net tons.



LONG CAR DUMPER AT REST.

The steam cylinder moves the car container by wire ropes passing over each end, arranged on the power-buckle plan. The slide valves of this cylinder are operated by a system of levers from the 5-foot lever already mentioned. For the management of the entire apparatus only three men are needed.

The Atlanta Exposition.

One of the greatest fairs ever known to America. Many features of the Chicago World's Fair and new ones. Open Sept. 18 to Dec. 31. Low rates via the Queen & Crescent Route. Write to W. C. Rinearson, G. P. A., Cincinnati, O., or printed matter.

LAKE SUPERIOR IRON MINES.

It is reported that the Lake Superior Consolidated Iron Mines has settled the suit of the Lone Jack Iron Co., for $84,000, on the ground of fraud, for $60,000.

The Norman mine turned out 30,030 tons in September and then stopped shipments.

The Lone Jack and Mesabi Mountain have shipped something over 500,000 tons, the Lone Jack furnishing about three-fourths of it.

At the Commodore mine, the water, which has been accumulating rapidly, has been overcome. At the Franklin, Bessemer and Victoria, the other Rockefeller-Corrigan properties in the same vicinity, work is going on actively.

The shipments from Two Harbors were 1,720,000 tons up to Oct. 1, and from Duluth and Superior together about 1,400,000 tons. It is expected that the season's total from the Vermilion and Mesabi ranges will be in the neighborhood of 4,000,000 tons.

Official figures for all iron ore shipping ports showed a total shipment of 8,105,212 tons to Oct. 1.

The two days' suspension of operation at the Norrie mine, caused by the walking out of 200 trammers and timbermen, was terminated by the strikers going back at the old rate.

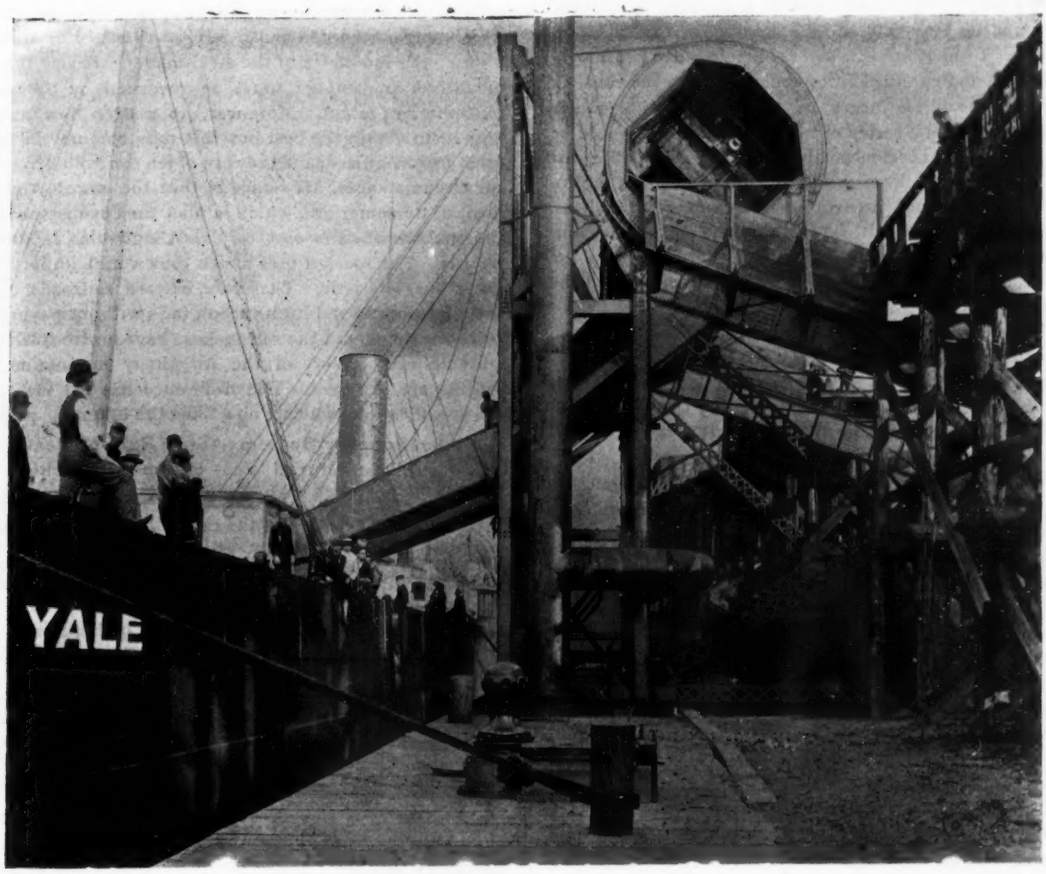
The Odanah Mining Co. will start the Cary, West Cary and Superior mines on the Gogebic, after an idleness of more than a year.

A lease of the Rouchleau-Ray properties on the Mesabi range has been made to the Minnesota Iron Co. at a 25 cent royalty.

The Columbia mine has made an output of 60,000 tons this season and now produces at a daily rate of 400 tons.

In connection with the sale of 2,500 tons of ore that has been in stock at the Perkins mine, Menominee range, for several years, it is noted that while analyses at the time the ore was stocked showed .028 to .030 phosphorus, the ore is now found to contain .014 phosphorus, a portion of that element having leached out meantime.

Operations have been resumed at the Buffalo mines, though only 50 men are now employed, the stockpiles containing 65,000 tons.



LONG CAR DUMPER IN ACTION.

A new shaft is being sunk at the Aurora mine to take the place of No. 5, which was lost two or three years ago in the big cave-in.

The Humboldt mine at Humboldt, Mich., on the Marquette range, is preparing to resume. It is a hard non-Bessemer property and employs 200 men.

The report of Mine Inspector Trestrail for Dickinson county, Mich., for the year ending Sept. 30, 1895, shows the total amount of ore mined to be 1,243,218 tons, distributed as follows: Chapin, 561,827; Pewabic, 257,755; Millie, 8,139; Traders, 20,090; Keel Ridge, 13,319; Quinnesec, 596; Cyclops, 1,800; Aragon, 141,752; Curry, 53,000; West Vulcan, 130,000; Loretto, 54,640. The average number of men employed in the above mines in this period was 1 984, the average number at the Chapin being 698; Pewabic, 467; Aragon, 271; West Vulcan, 218; Loretto, 154; Curry, 107, and smaller numbers at other properties. Of the 16 mines in the county, 12 produced ore in the year. The total number of persons employed Oct. 1, 1894, was 2,036; on Oct. 1, 1895, 2,352—a gain of 316. The number of persons killed in accidents was 6, or 3.03 per thousand men employed.

There are now about 2,300 men employed at the mines in Ishpeming. This includes the Winthrop and Section 21 properties. At Negaunee and on the Cascade range there are less than 700 men at work, but it is possible that there will be between 800 and 1,000 men working at the mines there within the next two weeks, as the forces are being increased daily. It is estimated that there are about 1,000 less men employed now than before the walkout in July.—Mining Journal.

A recent record of the S. S. Curry is worthy of special note. On Sept. 24 she delivered a cargo of 2,992 gross tons at South Chicago from Lake Superior. On Sept. 26 she delivered at the same place 3,883 gross tons from Escanaba, and on Oct. 1, one week from the time of delivering her first cargo, she again unloaded 3,875 gross tons from Escanaba. This makes a total of 10,750 gross tons delivered within one week, traveling a distance of 1,320 miles.

The Aragon has shipped upward of 130,000 tons this season.

Shipments of ore from Ashland last week were 61,294 tons; for the season, 2,167,310 tons. The Aurenia took out the largest Ashland cargo on Oct. 8—3,931 tons.

WESTERN SPECIFICATIONS FOR BESSEMER STEEL RAILS OF HEAVY SECTION.*

BY ROBERT W. HUNT.

In 1888 (Transactions, Vol. XVII—226), the writer had the honor of submitting to the institute a paper on "Steel Rails and Specifications for Their Manufacture." In his judgment the specifications were sufficient for "that day and generation." In the paper I said: "The first duty falls upon the railroad engineer in designing his section. If that is bad, the steel-maker will be heavily handicapped in trying to furnish a satisfactory rail. I suppose it is hopeless to expect the adoption of standard sections." That which I dared not hope has practically come to pass.

In 188- the American Society of Civil Engineers appointed a committee to consider "the proper relations to each other of the sections of railway wheels and rails." Their labors were supplemented by those of a later committee of the same society, appointed in 1890, and directed to submit a report on a series of rail sections ranging from 40 to 100 lbs. per yard, varying by 5 lbs. It fell to my lot to be a member of the last committee, and its secretary during the final and greater part of its labors. I mention this as evidencing my familiarity with the honest and careful efforts made to obtain the views of the leading railroad engineers of the country, harmonize differences and design a series of rail sections which would be in accord with their experiences and generally acceptable. At the same time steel-makers were consulted, so that the proposed sections might not present manufacturing difficulties. It required three years of faithful work on the part of the committee, before they were able to make a full report to the society. In August, 1893, their report was accepted and the committee discharged.

While the constitution of the American Society of Civil Engineers prevented them from adopting the rail sections as theirs, they are popularly so regarded and called; and what is better, have been already largely adopted by the railroads of the country, and promise soon to be absolutely the standard American sections.

In my former paper I stated that I was convinced that the disappointing wear so often obtained up to that time from the heavier sectioned rails had "been largely the fault of the sections themselves." As I believe the standard sections just named are good ones; if they fail to give satisfactory service in my opinion we must look in other directions for the cause. The years of continued experience since 1888 have made me all the more positive of the supreme importance and influence of the physical and mechanical treatment of the metal while being converted into steel and cast into ingots, and of the steel while being made into rails.

Since the presentation of my former paper, many changes in the routine of manufacture have been generally adopted by American rail makers. "Hot heats" in the converter are strenuously avoided; greater care is exercised in teeming, and as to the character of the ingot molds used; it is exceptional to throw ingots on their sides while the interior metal is yet liquid, and vertical furnaces, or so-called gas soaking pits, have been adopted by the largest makers. By so handling the ingots and the use of such furnaces, and by being liberal in cutting off the top ends of the blooms, the danger of piped rails has been brought to the minimum.

My former statement that "the character of the permanent way of the railroads of the United States is improving each year," still holds good, and the demand on the mills for well finished rails is imperative. As a rule this has been well met by the makers, and I know the general finish of the rails delivered to the roads to-day is many per cent higher than it was seven years ago. Much stricter inspection has been insisted upon and it has born its fruit.

The material interests of the country are just recovering from a period of gread depression, and the coming year promises to be one of large rail purchases, and in many cases the roads will be compelled to replace light sections with heavier ones. The American society rail sections were designed to obtain as much work as possible from the rolls on the rail heads; at the same time it is impossible to get as fine grained steel in the head of an 80-lb. rail as in a 56 or 60 lb. one, and it must not be expected that a coarse, open-grained rail will wear as well as the finer one. To my mind this fact explains the whole "mystery" of the superior wear of the old light sectioned rails; many of which were of very bad chemical character. Now, if we cannot obtain the resistence to wear from the fineness of structure due to work, we must seek it from hardness and soundness due to chemical composition. And as we increase the sections we can with safety add to the hardness.

During the discussion of Dr. Dudley's paper (Trans. IX-1881), I sought to defend silicon from some of the charges made against that element, and in a paper on "Bessemer Steels" read before the Franklin Institute Jan. 25, 1889, I presented a large number of analyses of many kinds of steel to sustain the same position. And the makers of steel castings long ago demonstrated the value of silicon in obtaining soundness when added to the metal after conversion. In the specifications which Mr. P. H. Dudley prepared for the N. Y. C. & H. R. R. Co., he recognized the value of silicon; so have many European rail makers. But while we are seeking to make our rails chemically harder, we must not lose sight of an element which, while hardening, also tends toward brittleness—phosphorus, the *bete-noire* of the steel-maker. Hence the increase of carbon percentage must be governed by the amount of phosphorus present. Moreover, no matter how anxious we may be to obtain the best possible rails, commercial conditions must be recognized, and they are of ten controlled by geographical circumstances. It happens that the largest American deposit of Bessemer ore, which is also the cheapest, available to the makers of rails east of the Alleghenies, is low in phosphorus. The foreign ores which they would import have the same characteristic. Therefore, eastern railroads can obtain low phosphorus and high carbon rails without paying an extra price for them, and the rail-makers have no trouble in getting suitable ores. West of the Allegheny mountains the conditions are different. The difference has led me to prepare the specifications which I now have the honor to present:

Specifications for Bessemer Steel Rails of Heavy Sections Manufactured West of the Alleghenies.

SECTION.

SEC. 1. The section of the rail rolled shall conform to the template furnished by the railroad company, with an allowance in height of $\frac{1}{64}$ of an inch under, and $\frac{1}{32}$ over, being permitted in a delivery of 10,000 tons of rails. The fit of the fishing or "male" template shall be maintained perfect.

SEC. 2. The weight of the rail shall be kept as near to —— pounds per yard as is practical after complying with Sec. 1.

LENGTHS.

SEC. 3. The standard length of rail shall be thirty (30) feet at a temperature of 60 degrees Fahrenheit. Shorter rails of —— lengths will be accepted to the extent of 10 per cent (10%) of the entire order. A variation in length of ¼ of an inch longer or shorter than the above specified lengths will be allowed.

FINISH.

SEC. 4. The rails must be free from all mechanical defects and flaws, and shall be sawed square at the ends, and the burrs made by the saws carefully chipped and filed off, particularly under the head and on top of the flange.

SEC. 5. The rails shall be smooth on the heads; straight in all directions, both surface and line; and without any twist, waves or kinks; particular attention being given to having the ends without kinks or drop. The hot-straightening shall be carefully done, so that gagging under the cold press will be reduced to the minimum, and so applied that the rails shall not be made "lumpy." None such will be accepted except as No. 2 rails.

DRILLING.

SEC. 6. Circular holes — inch in diameter shall be drilled through the web at — inches from the bottom of the flange. The center of the first hole — inches from the end of the rail; and — inches from the center of the first to the center of the second hole. These holes must be accurate in drilling in every respect, and left without burrs.

BRANDING.

SEC. 7. The number of the charge, the name of the maker, the month and year of manufacture, shall be marked in plain letters and figures on the side of the web of the rail, in such a position as not to be covered by the fish-plates when laid in the track.

CHEMICAL COMPOSITION.

SEC. 8. The carbon in the 70 lb. section shall not be below 0.43% nor over 0.51%. In the 75 lb. section not less than 0.45% nor over 0.53%. In the 80 lb. section not less than

*Read at the Atlanta meeting of the American Institute of Mining Engineers, Oct. 9, 1895.

0.48% nor over 0.56%. In the 90 lb. section not less than 0.55% nor over 0.63%. In the 100 lb. section not less than 0.62% nor over 0.70%. The phosphorus shall not exceed 0.085%. The silicon shall not be below .10%. The remainder of the chemical composition of the steel to be left to the makers' judgment.

TESTS.

SEC. 9. While the heat is being cast, two test-ingots shall be made; the first from steel going into the first regular ingot; the other from metal representing the last one. These test-ingots shall be 3″x3″, and not less than 4″ long. From these, bars at least ½″ square shall be drawn at one heat by hammering. Each bar when cold shall be bent, without breaking, to not less than a right angle. Should one bar from a heat fail and the other stand the test, a third bar may be taken from a bloom rolled from the same ingot represented by the failed bar. If this stands the test, it shall be accepted in lieu of the failed one. If the makers choose, more than the two test ingots may be taken, but they must be from the steel of the first and last regular ingots. If this is done and a test-bar fail, another one may be drawn from the duplicate ingot and tested, and if it stands, accepted.

DROP TESTS.

SEC. 10. A rail butt from each conversion shall be placed either head or base upwards on solid steel or iron supports, the distance apart of which in the clear shall be three feet (3′) for sections up to and including 70 lb., and four feet (4′) for all heavier ones; and upon them shall be dropped a weight of 2,000 lb., falling freely from a height of 16 feet for 70 lb. and 20 feet for all heavier rails. Should a test fail to stand the drop without breaking, a second one may be made. If it also fails, all rails made from that heat shall be rejected; but if the second test stands, then a third one shall be made, which if successful, the rails of that conversion shall be accepted.

TREATMENT OF INGOTS, ETC.

SEC. 11. After the ingots are cast, they shall be either constantly kept in an upright position until ready to be rolled, or else so maintained until the interior steel has had time to solidify.

SEC. 12. No "bled" ingots, or ingots from "chilled" heats shall be used in the manufacture of rails under this contract.

SEC. 13. No ingots from badly-teemed heats shall be used; excepting as they shall be subject to the provisions of Section 17.

CUTTING OF BLOOMS.

SEC. 14. After cutting off, or allowing for the "sand" or top end of each ingot, at least 12 inches more of seemingly solid steel shall be cut off that end of the bloom: a greater length than 12″ being preferred; and if, after cutting such length, the steel does not look solid, the cutting shall continue until it does.

HEATING.

SEC. 15. Care shall be taken to avoid overheating the steel; and under no circumstances shall a "cinder-heat" be allowed—that is, a heat high enough to cause the cinder to run off the steel as it is being drawn from the furnace. This does not apply to cinder which may be sticking to the underside of the steel when drawn from a horizontal furnace, or to the bottom of an ingot when drawn from a soaking pit.

INSPECTION.

SEC. 16. Inspectors representing the purchaser shall have free entry to the works of the makers at all times while this contract is being filled, and shall have all reasonable facilities afforded to satisfy them that the rails are being made in accordance with these specifications. The makers shall furnish them with the carbon determinations of each heat, and sufficient number of complete analyses to represent the average steel of each day's work.

SEC. 17. The inspectors shall have power to reject rails made from insufficiently-sheared blooms; or from heats the test pieces or drop tests of which have failed; or from badly poured heats; or from "chilled" heats; or from "bled" ingots. The rails made from insufficietly-cut blooms, if otherwise perfect, to be afterwards received as No. 1 short rails, if sufficient length have been sawed off to make an amount of steel equal to the original demand of 12 inches. The rails made from heats, the test pieces or drop tests of which have failed, may be accepted as No. 2 rails. The rails from a badly poured heat may be received as No. 2 rails; but if made from a "chilled" heat or "bled" ingot, to be absolutely rejected. By a badly-poured heat is meant one which, from any cause, has been teemed without the control of the operator. A "chilled" heat is one which, by reason of the steel chilling, has to be either pricked or poured over the top of the ladle. A "bled" ingot is one from the center of which the liquid steel has been permitted to escape.

SEC. 18. Imperfectly drilled, straightened (except "lumpy" rails), or chipped and filed rails shall be rejected, but will be accepted after being properly finished.

SEC. 19. Rails failing to comply with Section 1 will be rejected as No. 1 rails.

NO. 2 RAILS.

SEC. 20. The requirements for No. 2 rails shall be the same as for No. 1, except that they will be accepted with a flaw in the head not exceeding ¼ of an inch, and flaws in the flanges not exceeding ½ inch in depth, and may have been made from an imperfectly poured ingot, or heats from which the test-bars or drop tests have failed.

SEC. 21. No. 2 rails to the extent of —— per cent of the whole order will be received.

The only practical source of ore supply for the Western mills are the Lake Superior districts, and until lately the available supply of ore even moderately low in phosphorus was limited. For this reason the Western standard of Bessemer pig iron was 0.10% phosphorus. Of course steel rails made from such iron would have quite 0.11% phosphorus, and in many cases that element ran up to 0.12%, and sometimes higher.

The later ore developments in the Lake Superior region, particularly on the Mesabi range, have altered this, so that for next season it will be perfectly practicable for the Western rail-makers to keep the phosphorus in their rail steel under 0.09% I know it will be said that even now there is not enough low-phosphorus ore developed to permit the adoption of such a standard. I must take exception to this. Ore mixtures have been purchased based on the works' expected total production of Bessemer steel; as the metal came from the blast furnace it was made into soft steel for wire rods, billets, tin plate bars, etc., or into harder metal for rails, as the mill orders happened to demand. I believe the time has arrived when rail steel must be considered as a special metal, and the blast furnaces charged accordingly. Of course this may cause some inconvenience, and slightly increased cost to the rail makers, but that should not prevent the practice, if it is necessary for the production of better rails. Such increase would not be very large, and the present condition of the trade would not indicate that the margin of profit is too narrow to allow its being incurred. But if such is not the case, then let the rail-makers demand an extra price from the purchasers. If they can present a good case I have no doubt it would be allowed.

In regard to the claim of a too small available supply of low phosphorus ores; let us consider the figures. It is claimed that nearly 9,500,000 tons of ore will be shipped from the Lake Superior region this season, and fully 60% of this will be Bessemer. Five million seven hundred thousand tons of such ore would produce at least 3,000,000 tons of steel. The largest tonnage of rails of all kinds ever produced in this country was in in 1887—2,139,640 gross tons. Since then, 1892 was the heaviest year, with 1,551,844 tons; while 1893 yielded only 1,136,458 tons. In 1892, Illinois made 450,553 tons, and Pennsylvania 961,987 tons. Assuming that the Pennsylvania mills west of the mountains made 50% of the State's production, we would have a total Western production of 931,447 tons. As there is no immediate prospect of a demand beyond that of 1892, I believe of the 3,000,000 tons of possible Bessemer steel, less than one-third of it can be kept below 0.09 phosphorus.

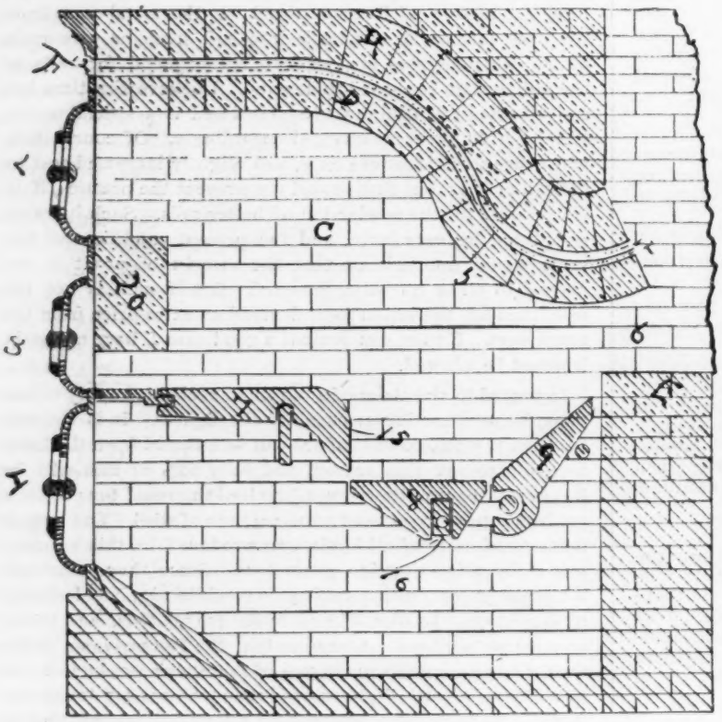
During the past year quite a large tonnage has been made under practically the conditions of these specifications, and from the experience with the rails in the track, and under the drop tests at the mills, I believe it will be proven that even a higher percentage of carbon can be used. But it is well not too advance to rapidly. The science of steel making is steadily progressing. Had the rail-makers, East or West, been asked a few years ago for such hard steel it is doubtful if they would have undertaken the manufacture. Indeed, when the first high carboned rails were delivered to the N. Y. C. & H. R. R. Co., the maker put himself on record as not being responsible for the damage which would almost certainly occur from their breakage under traffic. Nevertheless the rails were laid on the sharp curves below Spuyten Duyvil, and I believe up to this time not one has broken; and they have endured some five years of service.

The only important features in which the present specifications differ from those of 1888, is in providing for a chemical composition and drop tests. I have given my reasons for the former, and have added the latter as an additional safeguard, while increasing the hardness of the steel. I still insist on the test bars being used. I have left the guaranty as a matter of special understanding between purchaser and maker.

DOWN DRAFT SMOKELESS FURNACE.

The American Smokeless Furnace Co., of Cleveland, has perfected and is introducing a combined gas producer and steam boiler furnace which has made a good record for efficiency in every-day operation. A sectional view of the furnace, given in the illustration, will assist in following the explanation of its special features. Beside the side walls, the producer has the dome or top D, a bridge wall E, built up from below at the rear, and a front F having three sets of doors 2, 3 and 4. The doors 2 are for the introduction of fuel; the doors 3 for entrance to stoke the coal over the adjacent grate bars and the doors 4 for entrance to the ashpit and to grate bars.

The arch or top wall D of the gas producer is deflected downward at the rear and is fashioned carefully on curved lines over the entire exposed surface between the side walls. This enlargement also takes on the arch form, as seen at 5. The point 5 is an intensely hot place and it has been found difficult to get any material that will endure for any length of time the intense heat found here, especially if unduly exposed, as where a wall or arch is made with exposed corners of fire brick. This difficulty has been overcome by building a



heavy wall and arch at the discharge of the producer into the boiler furnace, protected at all points by a uniformly curved surface. The producer is practically filled with coal at all times and the coal line approaches the throat or discharge 6 but stops there. The coking of the coal and the liberation of its gases occurs mostly about the grates, though there will be roasting of coal higher up; but the flame begins in the throat 6 at the surface of the coal and runs back thence beneath the boiler. It will thus be seen that the curved surface over the throat requires all the precaution possible to prevent its burning out.

The arch D has a series of air passages 12, which discharge into the furnace at the throat 6 to mingle with the gas at that point and there is a further supply of air through one or more air passages at the bottom of the furnace beneath the boiler, having their entrance at the rear. By this arrangement the air is superheated in both the channel 12 and the one underneath the boiler, and abundant oxygen is supplied at the point where it is neeeed to promote perfect combustion and prevent the escape of combustible gases from lack of air.

There are three grates, 7, 8 and 9. The grates 7 are fixed rigidly in their place and extend downward about half the depth of the furnace. At their rear they have downward projections 15 corresponding to the depth at that point, at which are located the grates 8. The latter are rigidly fixed to a cross bar which has a beveled gear at each end, located in a pocket in the wall of the furnace, where it is protected from direct heat. Another gear meshes with this and is supported on a shaft running through to the front of the furnace. A crank handle may there be affixed to the shaft to rotate the grates 8 as may be needed for dumping. Back of the grates 8 are the inclined grates 9 which are set rigidly upon two rods. A pocket or basket is formed between the grates 7 and 9 with the bottom at 8, and in this the coal is thoroughly exposed to air passing in through the ash-pit. Thus the quantity of coal exposed is always large and there is no difficulty in getting a large volume of gas for large sized boilers when needed. This arrangement of grates makes it very easy to keep them clean, the grates 7 being accessible through the doors 3 with a poker and any ashes are either sifted through into the ash-pit or pushed back over the rocking bars, where they are dropped. An inclined shield 20 extends across the front and inside of the producer over the front ends of the grate bars 7 and serves to keep the space clear above the doors 3.

L. F. Shinners, who invented and perfected the producer and furnace as described above has also devised an under-feed furnace and stoker for which a patent has been asked. Its chief features are an external hopper, in front of the furnace, apparatus for forcing the coal forward from the hopper to an interior magazine, tuyeres in the grate bars, and an air supply pipe leading from a blower in the rear of the boiler to the tuyeres. An ordinary furnace may be furnished with these attachments or a new furnace built with them. The grate bars are supported at the ends in the usual way. A combined tuyere and grate bar is provided on either side of the middle line of the grate surface. At the bottom and center of the tuyeres are grooves to receive the air supply pipes, and their inner faces are rounded to facilitate the feeding of the fuel and insure more perfect operation. Between the tuyers, and built into the furnace from beneath the grate bars is a trough-shaped magazine, having a tubular extension through the front wall of the furnace, and ending in an external supply hopper. This tubular extension has a piston or conveyor, which is made to travel back and forth by a reversely cut screw shaft working with its thread in the piston. Gear connection is made with the shaft, to rotate it either way, as may be needed. By the forcing forward of the piston, the fuel is carried toward the magazine, lodging fresh coal at the bottom of the magazine and forcing the coked or heated coal into the furnace. The bottom of the magazine is inclined toward its rear end to facilitate this feed. When the coal is thus crowded forward into the furnace it distributes itself evenly along the trough of the magazine and rolls over upon the grate bars in a heated and combustible condition, with the volatile gases already expelled and consumed.

At the Forest City Brass Works, Cleveland, the under-feed furnace and stoker has been in use for some time; and besides securing a practically smokeless stack it has made a considerable daily saving of fuel, after allowance is made for the driving of the blower and the fuel conveyor. Instead of 2,700 pounds a day formerly used, the average is now about 2,200 pounds. At the Broadway mills, Cleveland, the gas producer and furnace whose construction is shown in the accompanying cut has been in use for several months and has shown a distinct economy of fuel, besides giving complete combustion and preventing the formation of smoke.

The American Smokeless Furnace Co. has also an economizing and smoke preventing furnace for house heating, known as the Florence. The directors of the company are: Wm. H. Beavis, president; J. H. Fuller, secretary and treasurer; L. F. Shinners, vice president and general manager; Chas. H. Stewart and H. L. Payne. Its offices are 709-10 Cuyahoga Bldg, Cleveland.

THE Johnson Co.'s shape mill at Lorain again improved on its record last week, rolling in 11 hours 407 tons of 83-pound girder rails.

MORE ELECTRIC TRANSMISSION OF POWER.

Within the past month two electrical plants for the transmission of power from water falls over long distances have been installed. That at Sacramento, Cal., has proved the feasibility of economically transmitting the power of a fall to a distance of nearly 25 miles. That at Portland, Ore., is still more important, because it presented many new electrical problems. These have been successfully solved and the thriving city of Portland now has a service of electricity from a waterfall more than 12 miles away. This installation was made by the Portland General Electric Co. The company owns the entire water power of the falls on the Willamette river at Oregon City, 12 miles above Portland, which, with a head of 40 feet, has a minimum capacity estimated at 50,000 horse power. Part of the power has already been utilized by numerous factories and mills erected near by, and in addition to these an electric station, build some years ago, has supplied current for lighting the streets and dwellings of Portland and for operating an electric street railway between Oregon and Milwaukee, seven miles away, the direct current and high frequency alternating systems being used.

In order to take advantage of the power of the falls the Portland General Electric Co. has constructed the first part of an extensive station on the west side of the Willamette river opposite the city of Oregon. The part constructed is one-quarter only of the building, which is being put up in sections. Twenty sections will complete the building; five are already built and foundations are already being laid for the remainder. The ultimate generating capacity of the station will be 12 800 horse power

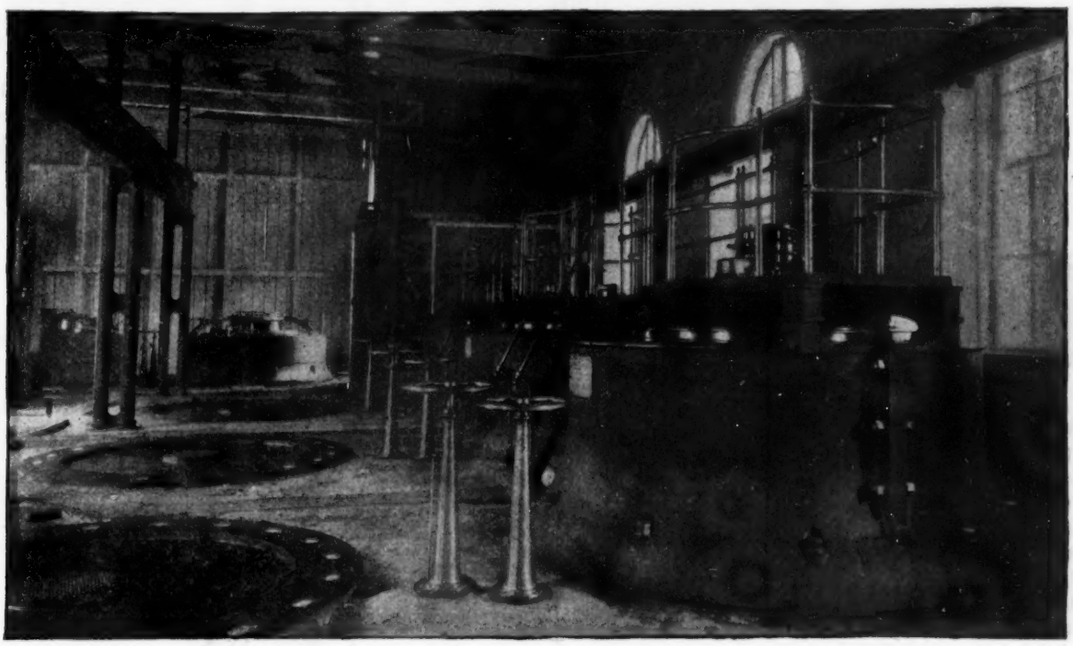


FIG. 1—INTERIOR OF STATION

The station building is of concrete, stone, iron and brick and when finished will have a length parallel with the river of 364 feet. The water is taken from the canal, led through an extensive hydraulic installation and discharged into the river below on the other side. The water wheel plant is from the works of the Stillwell-Bierce & Smith-Vaile Co., of Dayton, O., and consists at the present time of three units, each consisting of a pair of vertical cylinder gate improved Victor turbine wheels, 42 inches and 60 inches in diameter respectively. The larger wheel is an auxiliary to be brought into service only at periods of excessive high water, which the records show occur about once in every five years. The smaller wheel runs at a speed of 200 revolutions per minute and the larger at 100 revolutions per minute. Both turbines are set at the same level and each carries a pulley; that of the 60-inch wheel being fixed to the generator shaft. When the large wheel is in operation the two pullies are belted together, the smaller wheel is disconnected and the large wheel drives the generator at a uniform speed of 200 revolutions. When the smaller turbine is operated alone the belt lies upon a shelf surrounding the pulleys.

The weight of the vertical shaft with the armature is about 33,500 pounds and to carry this a system of extra bearings is introduced, one of the ring thrust type and the other a hydraulic oil bearing, both supplementing the ring bearings on the armature shaft. They are enclosed in cases filled with oil delivered by hydraulic pressure, and are surrounded by water jackets.

The length of the generator shaft is 29 feet, and 8⅜ inches in diameter. It is not a continuation of the shaft of the wheel but is coupled to it by means of a disc coupling, which allows of a certain free movement up and down of the generator shaft. The shaft of the 60-inch wheel runs from the coupling to a bearing set in the floor of the station. Both wheels in each section are controlled by hand wheels and both are regulated by the same governor. The belt tightener is also controlled from either floor by a hand wheel.

The water is admitted to the penstocks from the upper canal by means of a head gate operated from a platform on the canal side of the station. Each penstock is 10 feet in diameter and is constructed of riveted steel plates. Each wheel has its own flume, the water passing first through the large flume of the larger wheel to the flume of the smaller wheel whence it passes through a tube into the tail race. In addition to this turbine equipment, an auxiliary power equipment has been furnished, consisting of a set of pumps, including a hydraulic pump for supplying oil to the thrust bearing cylinders and a duplex water pump to circulate the water in the cylinder water jackets. They are operated by two 15-inch horizontal turbines enclosed in the same flume. For the operation of the exciters a further pair of vertical turbine wheels has been installed, each 48 inches in diameter, driving the generators by a similar system to that already described for the operation of the main machines.

The complete power plant will consist of 20 three-phase generators and two direct current generators, acting as exciters. The total capacity of the station, therefore, will be 12,800 horse power, divided into 20 units, each one independent of the other.

One peculiar feature of the Portland installation is the employment of large blocks of power for street railway service, involving the transformation of the polyphase current sent over the line into direct current for railway circuits. The frequency is 33 cycles per second, selected on account of the large amount of power which it was necessary to convert from alternating into direct current. The current is delivered directly to the line without first passing through transformers and when it reaches Portland is transformed down to a potential of 400 volts. For the power service the step-down trans-

formers are connected to rotary converters which will deliver a continuous current of 500 volts for street railway service, as well as for the operation of stationary moters. Induction motors will also be used directly connected to the secondaries of the step-down transformers when this can be done to advantage.

The five sections of the building already erected are occupied in the following order: The first section contains the pumps and the accumulators for the complete station; in each of the three following sections is one three-phase alternating current generator of 450 k. w. or 600 h. p. capacity, and the fifth section contains two 250 k. w. m. p. continuous current generators used as exciters. Each exciter is capable of exciting all of the 20 three-phase generators, and the second has been set up as a reserve in case of accident to the first. At present, one is furnishing direct current to the street railroads in Oregon City. When the station is complete, the exciter section will be removed from the fifth section, which it occupies at present, and will be placed in the center section of the building, where the switchboards will also be erected.

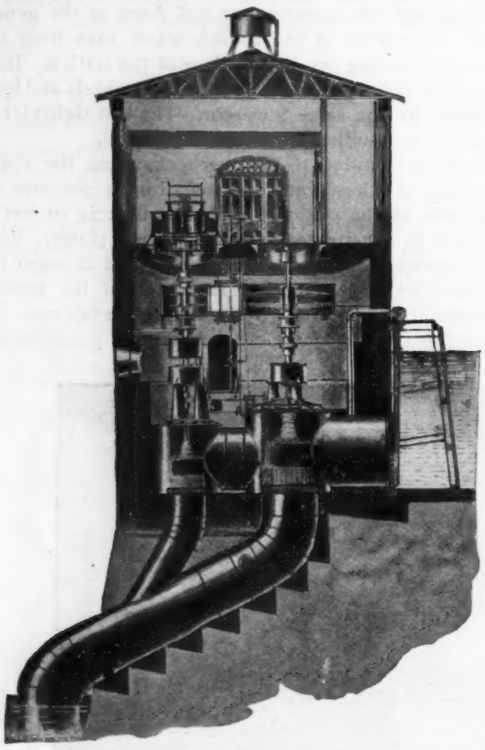


FIG. 2—SECTION THROUGH THE STATION.

From the generators the current passes directly to the line through the switchboard. The line is 14.3 miles long, a separate circuit being installed for each machine. It passes through an undulating country following the course of the Willamette river as closely as possible. The poles upon which the three-phase wires are strung also carry a number of wires for the 5,000-volt continuous arc current from the old transmission station, as well as the wires over which the old system of lighting with high frequency 5,000 volt alternating current is effected. The loss in the long distance transmission line is calculated at full load at about 11%.

At present the lighting from the three-phase system is used for large buildings, containing several hundred lights each. They are close to the city station and this distribution can be readily handled at about 400 volts. For the outlying and residential districts the high frequency apparatus with individual transformers will still be employed. Continuous current will be furnished to the railway and to the stationary motors already installed, but new motor installations will be made with the three-phase motors which will be run straight from the three-phase switchboard, in parallel with the rotary transformer.

The direct railway current will be carried to the East Side Railway station by means of cables under the Willamette river and this distribution will reach as far as Milwaukee where connection will be made in parallel with the 600 volt service from either station A or station B at Oregon City. The loop from Oregon City to Portland and back will thus be as follows: Beginning at Oregon City with 33 cycle three-phase current at 6,000 volts 14.3 miles will be traversed as far as Portland; the current will then be transformed to 400 volts alternating and passing through a rotary converter, issue therefrom at 600 volts continuous which will be transmitted eight miles to Milwaukee and connect with the continuous current from Oregon City.

This plant when finished will be one of the largest long-distance transmission plants in the world. Its satisfactory operation so far shows admirably, not only the effectiveness of the three-phase transmission system for general service, but also its feasibility. This has rendered possible its adaptation to the operation of important railway systems through simple apparatus, and to the working of a distributing network composed in a large part of existing lines.

PORTABLE DRILL AND TAPPING MACHINE.

The accompanying illustration shows a portable drilling and tapping machine, which can be operated at any distance, direction or position from the counter-shaft and, as the cut shows, can be readily attached to the pieces in which the holes are to be drilled and tapped and is easily handled by one man. The size shown, No. 7, will drill holes up to 1¼ inch diameter and drive a ⅞-inch tap in cast iron. There are four changes of speed for drilling and two for tapping, two of the speeds being used to back the tap out. This is done much faster than the tap is fed in. When the hole has been tapped deep enough the motion is reversed and the tap backed out by simply shifting the handle shown at the top of the cut to the opposite position. In drilling or tapping the power can be instantly stopped by moving this handle to a central position.

The feeding arrangement is patent differential geared and it entirely enclosed, being protected from dirt and damage and has quick return. This gives the free movement of the spindle up and down required for tapping, the tap feeding itself in and out of the hole the same as with a stationary drilling machine.

All the parts that have to stand the strain and wear are made of steel, including the gears which have their teeth cut from the solid. The bevel gears are cut by the planing process. The No. 7 has a feed of six inches. The hole in the spindle is No. 3 Morse taper. The post is 32 inches long, and the radial arm 12 inches long. The clamps open so as to take nine inches between them. The weight of the machine is 100 pounds. Counter-shaft, rope, and extra idle pulley for conveying the rope around corners or obstructions, are furnished with the machine ready to set up and run. The manufacturer is Albert L. Colburn, No. 6 Wall St., New Haven, Conn.

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INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review* and we will put you in communication with our advertisers at once.]

W. Morava, 65, 84 Adams st., Chicago, wants to buy a second hand 15 or 20 horse power, double drum, double cylinder hoisting engine.

Goeppen & Brown, formerly connected with the Ahrens & Ott Mfg. Co., of Louisville, Ky., will engage in the manufacture of plumbers' supplies and brass specialties in the same city, under the firm style of the Enterprise Brass Works. They are now getting their buildings in shape and have ordered an outfit of tools.

The Wilson Mfg. Co., Pittsburg, capital $250,000, will locate on the South Side, three sites being now under consideration. Hardware novelties and supplies will be manufactured, also the Wilson blind fastener. A bicycle repair department will be a part of the plant. The following comprise the company: Messrs. H. G. and W. A. Wilson of McKeesport, David E. Harris of Duquesne, and H. E. Daniels, W. G. Paul and L. V. Lenfesty, of Pittsburg. H. G. Wilson is president.

The National Machinery Co., of Tiffin, O., is in the market for the following tools: Milling machine with 5-foot table, milling machine with 6-foot table, both to have all improved attachments, to be pillar and knee style and to weigh from 4,000 to 5,000 lbs.; gear cutter, full automatic, to cut from 50″ to 60″ diameter, 8″ to 12″ face universal grinding machine to swing 12″ and to take 30″ to 40″ between centers; lathe, to swing 16″, with taper attachment; engine lathe, to swing 20″ to 22″.

Additions, Enlargements, Removals, Etc.:—

Ordway & Co., Peoria, Ill., want to buy a second-hand screw cutting lathe from one to two foot swing and three to six foot between centers.

The Weller Pipe Works, Gadsden, Ala., are being enlarged in order to meet an increasing business.

The Rogers Iron Co., Springfield, O., is at work on an addition 100x62 feet which will be used as a machine shop.

The Ferro Steel Co., Chagrin Falls, O., is enlarging its plant and will nearly double its output. Thirty men will be added in the molding department.

The Penn Hardware Co., Reading, Pa., has commenced the erection of an addition to its foundry building, which will give employment to 80 additional hands. It will be finished about Dec. 1.

The Dauntless Bicycle Co., Toledo, O., is adding materially to its machinery, and has moved into much larger quarters. The company formerly employed about 60 men, but expects to increase to about 250 men.

Trimont Mfg. Co., Roxbury, Mass., owing to increased business, recently decided to double the capacity of its drop forging plant. The company also decided to put in a new boiler which will furnish five times the power of the present equipment.

The Griffin Car-Wheel Co., of Chicago, is negotiating for a site in Minneapolis or St. Paul for a branch manufactory. The parent concern is capitalized for $1,000,000, and has a factory covering 12 acres of ground and employing 600 men. At St. Paul or Minneapolis it is proposed to erect a plant costing $100,000, and employing at the start 100 men.

New Construction:—

The W. Dewees Wood Co., McKeesport, is adding a trimming house to its plant. It will be of iron.

The Westinghouse Electric Co. will soon begin the erection of a foundry and machine shop in addition to its big East

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Pittsburg plant. The new department will be ready in January.

The Enterprise Iron Works, at Canton, Ill., recently destroyed by fire, are to be rebuilt. The works consisted of a foundry and machine shop and the proprietors are Savill & Sullivan.

Fires and Accidents:—

The Holland Radiator Works at Bremen, Ind., were totally destroyed by fire Oct. 11. The loss is total and insurance very small.

At Scranton, Pa., the dam of the Lackawanna Iron & Steel Co., from which the blast furnaces were supplied, broke last week and D. L. & W. yards and shops were flooded.

The old Lathewood foundry at Pittsburg was burned Oct. 10. The lower floor of the building was occupied by Fox & Co., manufacturers of oil well fishing tools. The loss to the latter was $15,000. Loss on building about $3,000.

In the Bessemer department of the Jones & Laughlin steel words at Pittsburg, Oct. 14, a ladle of molten metal was tipped over by an error of the men working the crane and seven employes were badly burned, one dying a few hours afterward.

The cast house at one of the Cleveland Rolling Mill Co.'s Central furnaces collapsed without warning on the night of Oct. 12. Four men were killed and a number seriously injured. The building was of steel covered with corrugated iron. No explanation can be given of its falling in.

General Industrial Notes:—

Vesuvius Furnace, at Ironton, O., has resumed after a month's idleness.

The Pulaski Iron Co., of Pulaski, Va., has leased the Max Meadows Furnace, at Max Meadows, Va.

J. W. Lewis, of Murpheysboro, Ill., has purchased the foundry and machine works of the Alexander Bros.

The Muncie Iron & Steel Co. has a new gas well and power now to run both the rod mill and the puddling department day and night.

The report of the receiver of the Linden Steel Co. showed net profits from Feb. 15 to Sept. 7, 1895, of about $11,000. The receiver asks authority to borrow $70,000 to continue operations and expresses the opinion that money can be made if it is properly operated.

The E. W. Bliss Co., of Brooklyn, N. Y., has placed an order for eight heavy iron planers with the Niles Tool Works Co., of Hamilton, O.

The Warder Bushnell & Glessner Co. will put out from their foundry department the coming winter, castings for 20,000 self-binders.

The old rail works at Covington, Ky., have been purchased by the Eureka Safe & Lock Co., who will remodel the plant to adapt it to their purposes.

More hands are constantly being put at work at the Union steel plant at Alexandria, Ind., another department employing 400 hands starting last week.

On Friday, Oct. 4, the South works of the Illinois Steel Co., made a record in both the day and night turns. In the day turn 112 heats were run and at night 114.

The Maryland Steel Co., of Sparrows Point, Md., proposes to start several of its furnaces in the near future. No date has been fixed for resumption at the steel plant.

By Nov. 15 the Midland Steel Co., Muncie, Ind., will have a new bar mill in operation. Following this improvement will be the erection of a third open hearth furnace.

The George J. Fritz Foundry and Machine Co., of St. Louis, Mo., has been incorporated by M. Fritz, E. H. Fritz and Martha M. Kalbfleisch, with a capital of $35,000.

The Dayton Coal & Iron Co., Ltd., Dayton, Tenn., has abolished the office of general manager. The new position of general superintendent is filled by Vincent Ferguson.

The Tonawanda Iron & Steel Co., of North Tonawanda, N. Y., will have its new stack in operation about Jan. 1. It will be 80x18 feet. Its estimated annnal capacity is 90,000 gross tons.

The Salem Wire Nail Co.'s Findlay, O., plant has closed down for the present. The country's wire nail consumption, even under the restriction of production in the past few months, has been less than the supply.

Albert Fisher, 1025 Monadnock Block, Chicago, who is the western representative of William Tod & Co., Youngstown, O., for the sale of their engines and machinery, has recently taken the western agency for the Cleveland City Forge & Iron Co., of Cleveland. Mr. Fisher has already been success-

ful in getting a good amount of business for the latter concern on forgings, turnbuckles and the Chapman jack.

The Bessemer department of the Pennsylvania Steel Co., at Steelton, Pa., is being remodeled. Ten-ton converters will replace the old seven-ton vessels. They are being built at Sparrow's Point. The direct process will be used.

Articles of incorporation have been filed on the Big Stone Gap Iron Co., of Jefferson, Ind., by Chas. T. Ballard, J. W. Gaulbert, S. Zorn, Oscar Fenley, St. John Boyle, James Ross Todd and R. C. Ballard. The capital stock is $150,000.

Notices have been posted in the bolt and nut works of J. H. Sternbergh & Sons, at Reading, Pa., announcing an increase in wages in all departments ranging from 5 to 10 per cent, which in the case of the bolt and nut makers amounts to an advance of 15 and 20 cents a day.

The Calumet Iron Works, of Harvey, Ill., a suburb of Chicago, made an assignment Oct. 11, with assets of $12,000 and liabilities of $8,000. The assignee is Arsemos R. Burkdale. This concern is successor to A. L. Hott & Co., and recently leased the foundry of the Automatic Mower & Mfg. Co., of Harvey.

The Penn Steel Casting & Machine Co., of Chester, Pa., has received the largest contract for steel castings that has ever been given out in this country, from the Baldwin Locomotive Works. The order comprises 280 driving wheel centers, of about 3,000 pounds each, with the necessary crossheads, driving boxes and other castings.

Receiver T. W. Hill, of the Lorain Mfg. Co., Lorain, O., manufacturers of plumbers' supplies, has made a final report, showing receipts during his receivership of $121,162 33, all derived from an assessment of stockholders. Of the total amount the trustee of the Selah Chamberlain estate paid $64,224 and Elizabeth Witt, $33,971.05.

The Grant Locomotive Works, Chicago, operated by the Siemans & Halske Electric Co., reports good business. Since August the company has turned out four steam locomotives and has four more which will be finished within the next two weeks. At present the company is working 800 men, but this number will be largely increased in a short time when certain changes are made in the works, which contemplate the use throughout the establishment of electric motors for furnishing power.

The Lane & Bodley Co., of Cincinnati, reports a very fair recent business with Mexico—a steam plant for a government school, a saw mill, an engine for sugar mill, an engine and boiler for electric lighting on a race course, a complete Corliss engine steam plant with transmission machinery for a woolen mill being received within a few weeks.

The Akron Tool Co., Akron, O., is now turning out a second order for a dozen of its McNeil patent-balanced automatic-dump charging barrows for the Salem Iron Co., Leetonia, O., for handling coke. The same company is also making some large, extra heavy barrows of the same pattern for handling hot coke for the Erie Gas Co., Erie, Pa.; Cleveland Gas Light Co., Cleveland, and People's Gas Co., Cleveland.

Excelsior furnace at Ishpeming, Mich., will be well equipped when it starts up again early in November. A new hot blast of increased capacity has been put in and an engine of triple the capacity of the old one. The casting house has been increased by one-third. Of the 17,000 tons of iron in the furnace yard when operations were suspended, all but 1,500 has been shipped away and this will be sent out this month.

The decision will be given Oct. 22 by the Circuit Court at Superior, Wis., on the application of the Central Trust Co., of New York, for a receiver in its interest, for the West Superior Iron & Steel Co. Robt. Kelly is the present receiver, but it is claimed that by stipulation of the creditors he will abdicate to allow the Central Trust Co. to foreclose a trust deed it has on the property in the sum of $1,339,000, in addition to which is $500,000 in accrued interest and cost.

The Peoria Steel & Iron Co., Peoria, Ill., is making arrangements for resuming at an early date. The plant has a daily capacity of 125 tons. It was operated steadily during the severest part of the depression, but was placed in receivers' hands last fall as a friendly arrangement for the settlement of complications. These have been adjusted, and an early resumption is assured. The company is in need of a superintendent. G. J. Gibson is president of the company and B. J. Greenhut is receiver.

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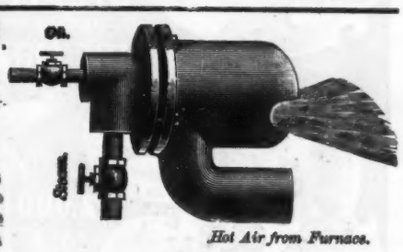

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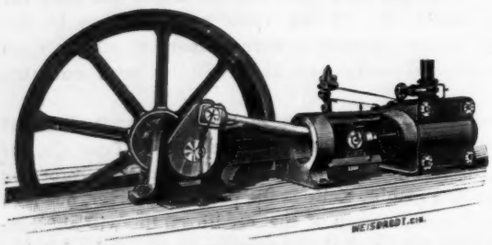

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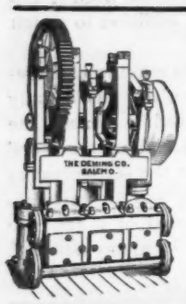

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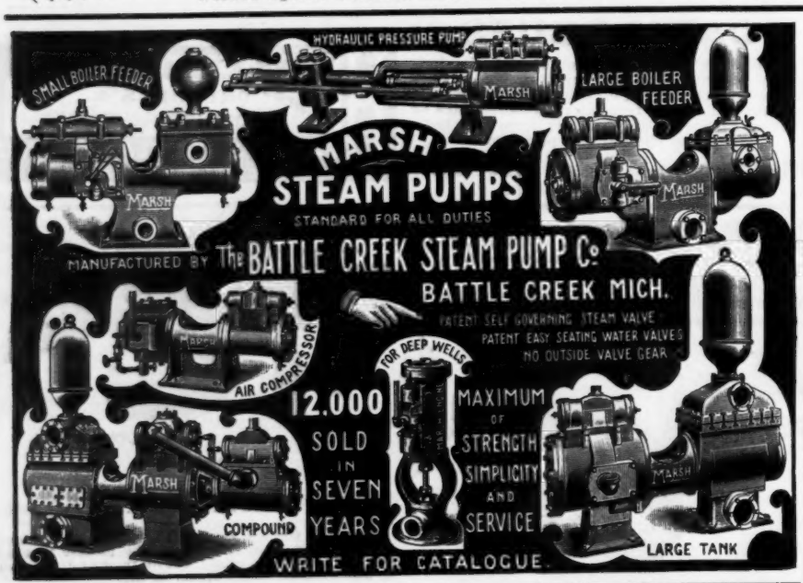

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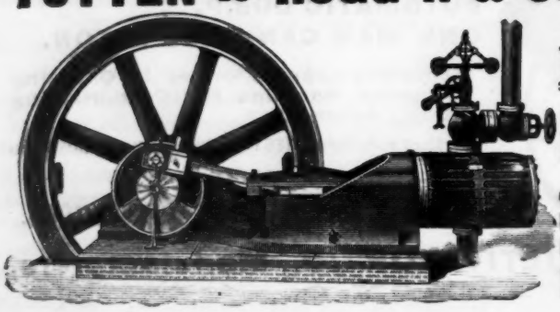

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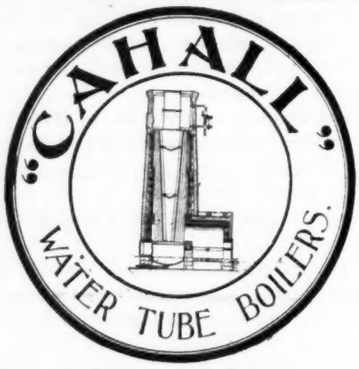

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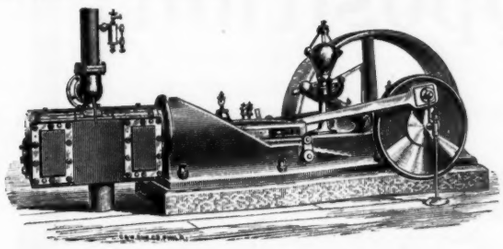

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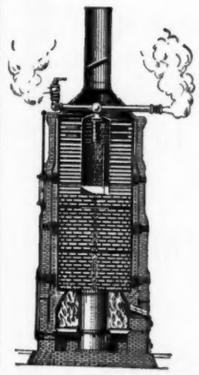

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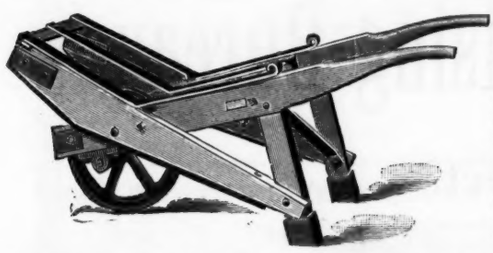

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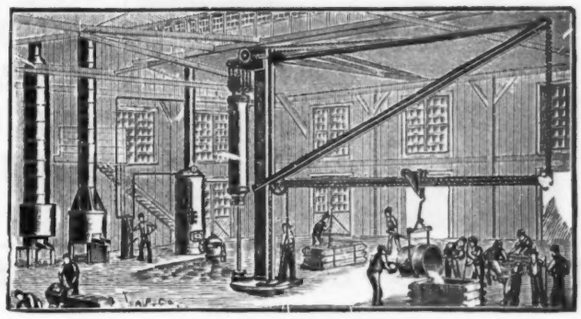
But you—foolish and wasteful man that you are—never let on you hear him and go right along wasting your time and your money, doing your work by hand until you wake up some fine day and find the other fellow, the wise and smarter fellow, has called in his old faithful friend Steam and with his help has stolen your trade. It's the little things that count in business now a days. A doller saved here and a dollar saved there. Despise not the day of small things.



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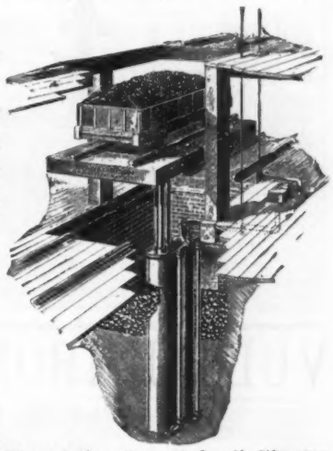
The Ridgway Steam Hydraulic System of Cranes is a Godsend to you if you were but smart enough to know it.

Simply and cheaply, with no special installation, by its use you can attach the steam you have, without burning one pound of extra fuel, to the work you are now spending many dollars for. Why don't you do it? Look around over your plant and see the gangs of men wasting money. Why don't you do it? Say, why don't you? Aren't you smart enough to keep up with the times? Don't you know the best concerns all over the land are putting in these Cranes and shouting for joy about them, and you, you are getting left.



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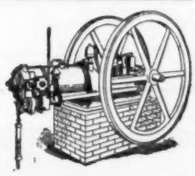

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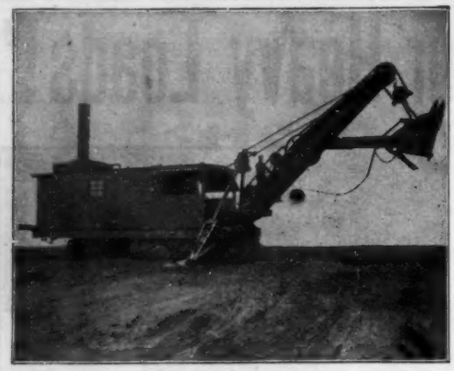

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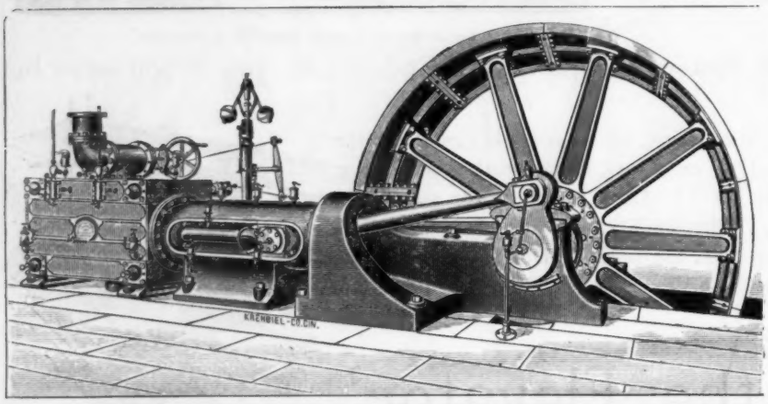

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Capacity 1,500 cu. yds.

See next issue.

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Sample piece of FLUE taken from Locomotive No. 725 running for 7 months on Western Division of N. Y. C. & H. R. R. R. showing amount of SCALE adhering up that time.

If you desire further information, send for our circular which goes into the subject with cogent reasoning, as well as scientifically, corroborated by testimonials, any of which would convince a practical mechanic, but as "seeing is believing," send in your orders and save time, trouble and money by commencing the use of this known valuable **COMPOUND** at once. Canned in five-pound tins and packed in 100-pound cases, for Land Boilers, price $20 per case. Canned in one-pound tins and packed in 50-pound cases, for Locomotive Boilers, price $25 per case.

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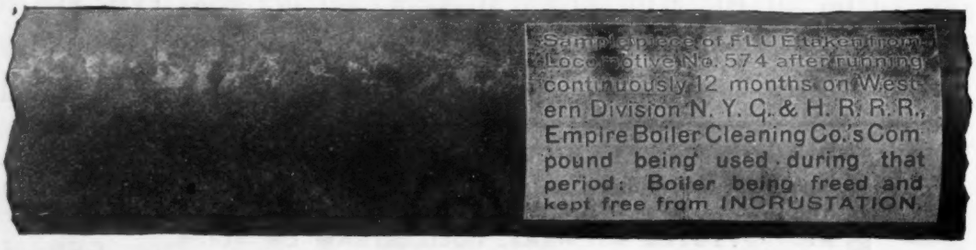
Sample piece of FLUE taken from Locomotive No. 574 after running continuously 12 months on Western Division N. Y. C. & H. R. R. R., Empire Boiler Cleaning Co.'s Compound being used during that period. Boiler being freed and kept free from INCRUSTATION.

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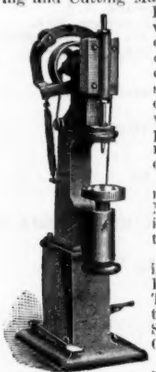

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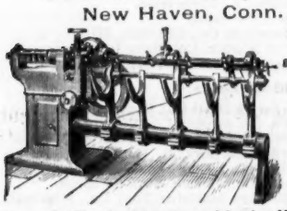

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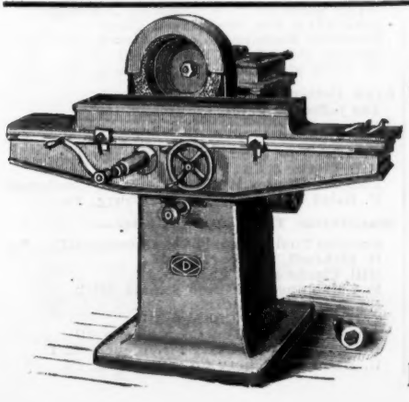

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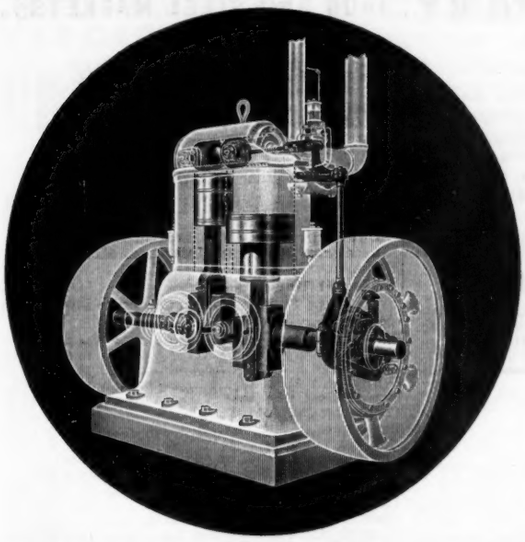

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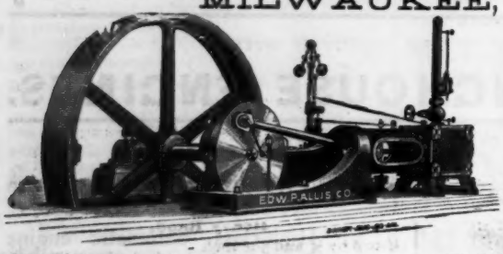

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No. 1 American Scotch	15 65
No. 2 American Scotch	14 65@ 15 15
Lake Superior Charcoal	15 50@ 16 00

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No. 2 Foundry	14 00@ 14 25
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CHICAGO (reported by our representative:)

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Local Coke Foundry No. 2	14 50@ 15 00
Local Coke Foundry No. 3	14 00@ 14 50
Local Scotch Foundry No. 1	15 00@ 15 50
Local Scotch Foundry No. 2	14 50@ 15 00
Local Scotch Foundry No. 3	14 00@ 14 50
Southern Coke No. 1	10 70@ 11 00
Southern Coke No. 2	14 00 .....
Southern Coke No. 3	13 65 .....
Southern No. 1 Soft	14 15 .....
Southern No. 2 Soft	13 90 .....
Southern Silveries No. 1	15 25@ 15 75
Southern Silveries No. 2	15 15 .....
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Ohio Silveries No. 1	15 00@ 15 50
Ohio Silveries No. 2	14 50@ 15 00
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Southern Coke No. 2 and No. 1 Soft	12 75@ 13 00
Hanging Rock Coke, No 1	12 50@ 13 50
Hanging Rock Charcoal No. 1, Fdy	16 00@ 17 00
Tennessee Charcoal No 1	14 00@ 14 50
Jackson County Silvery No 1	14 00@ 15 00
Southern Coke, Gray Forge	12 50
" " Mottled	12 25@ 12 50
Standard Alabama Car Wheel	15 75@ 16 25
Tennessee " "	14 50@ 15 00
Lake Superior " "	15 50@ 16 50

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Southern Coke No. 3	13 00@ 13 25
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Missouri Charcoal No. 1	14 00@ 15 00
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Flat Bar.

1¼ to 4 by ⅜ to 1 inch	1 60
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1¼ to 6 by 1⅛ to 2 inch	1 80
1¼ & 1⅜ by ⅜ to ¾ inch	1 65
1 & 1⅛ by ⅜ to ¾ inch	1 70
⅝, ¾, ⅞, by ⅜ to ⅝ inch	1 80

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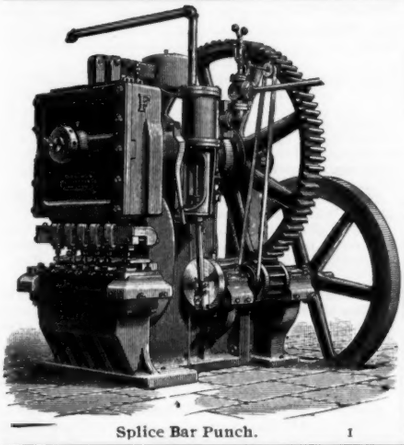

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2 to 2⅝ inch	1 80
2¾ to 3¼ inch	1 75
3⅜ to 4 inch	2 10
4¼ to 4½ inch	2 70
4¾ to 5 inch	2 90

Oval.

⅜ to 1¼ inch	1 80
⅜ to ¾ inch	1 80
½	2 00
⅝	2 20

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1⅛ to 3 inch	2 15
⅜ to 1¼ inch	1 95
⅜ to ¾ inch	2 20
½	2 35
⅝	3 45

Heavy Band.

1¼ to 6 by ¼ and 5-16 inch	1 70
1 to 1¾ by ¼ and 5-16 inch	1 75
¾ to ⅞ by ¼ and 5-16 inch	1 85
½ to ⅝ by ¼ and 5-16 inch	2 10

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1 7-16 to 4, No. 13, 14, 15 and 16	2 15
1 7-16 to 2, No. 17, 18 and 19	2 20
1 7-16 to 2, No. 20	2 30
1 7-16 to 2, No. 21	2 40
1 7-16 to 2, No. 22	2 50
1⅛ to 1⅜, No. 13, 14 and 15	2 20
1⅛ to 1⅜, No. 16, 17 and 18	2 25
1⅛ to 1⅜, No 19 and 20	2 30
1⅛ to 1⅜, No. 21	2 40
1⅛ to 1¾, No. 22	2 50
15-16 and 1 inch, No. 13, 14 and 15	2 15
15-16 and 1 inch, No. 16, 17 and 18	2 30
15-16 and 1 inch, No. 19 and 20	2 40
15-16 and 1 inch, No. 21	2 50
15-16 and 1 inch, No. 22	2 60
⅞, No. 13, 14 and 15	2 40
⅞, No. 16, 17 and 18	2 50
⅞, No. 19 and 20	2 60
⅞, No. 21	2 70
⅞, No. 22	2 80
13-16, No. 13, 14 and 15	2 50
13-16, No. 16, 17 and 18	2 60
13-16, No. 19 and 20	2 70
13-16, No. 21	2 80
13-16, No. 22	2 90
¾, No. 13, 14 and 15	2 60
¾, No. 16, 17 and 18	2 75
¾, No. 19 and 20	2 85
¾, No. 21	2 95
¾, No. 22	3 05
11-16, No. 13, 14 and 15	2 85
11-16, No. 16, 17 and 18	2 90
11-16, No. 19 and 20	3 00
11-16, No. 21	3 10
11-16, No. 22	3 20
11-16, No. 23	3 30
⅞, No. 13, and 15	2 90
⅞, No. 16, 17 and 18	3 00
⅞, No. 19 and 20	3 10
⅞, No. 21	3 20
⅞, No. 22	3 30
⅞, No. 23	3 40
9-16, No. 13, 14 and 15	3 10
9-16, No. 16, 17 and 18	3 20
9-16, No. and 20	3 30
9-16, No. 21	3 40
9-16, No. 22	3 50
9-16, No. 23	3 60
7-16 and ½ inch, No. 13, 14 and 15	3 30
7-16 and ½ inch, No. 16, 17 and 18	3 40
7-16 and ½ inch, No. 19 and 20	3 50
7-16 and ½ inch, No. 21	3 60
7-16 and ½ inch, No. 22	3 70
7-16 and ½ inch, No. 23	3 80
⅝, No. 13, 14 and 15	3 80
⅝, No. 16, 17 and 18	3 90
⅝, No. 19 and 20	4 00
⅝, No. 21	5 31
⅝, No. 22	4 40
⅝, No. 23	4 55

Light Band.

1½ to 6 by ⅛ to 3-16 inch	1 90
1½ to 6 by Nos. 11 and 12	1 95
1 to 1⅜ by ⅛ to 3-16 inch	1 95
1 to 1⅜ by Nos. 11 and 12	2 00
⅞ and 13-16 by ⅛ to 3-16 inch	2 10
⅞ and 13-16 by Nos. 11 and 12	2 15
¾ and 11-16 by ⅛ to 3-16 inch	2 20
¾ and 11-16 by Nos. 11 and 12	2 25
⅝ and 9-16 by ⅛ to 3-16 inch	2 35
⅝ and 9-16 by Nos. 11 and 12	2 40
½ by ⅛ to 3-16 inch	2 50
½ by Nos. 11 and 12	2 55

Wagon Box Iron.

⅝ inch, beveled edge, by Nos. 11 and 12	2 10
⅞ inch, " " " " 13 and 14	2 20
¾ inch, " " " " 11 and 12	2 25
¾ inch, " " " " 13 and 14	1 55

Sheet Iron.

No. 10	2 10
No. 12	2 20
No. 14	2 25
No. 15-17	2 35
No. 18	2 50
No. 20	2 65
No. 22-24	2 75
No. 25-26	2 85
No. 27	2 95

Steel Boiler Plates—1-4 in. and Heavier.

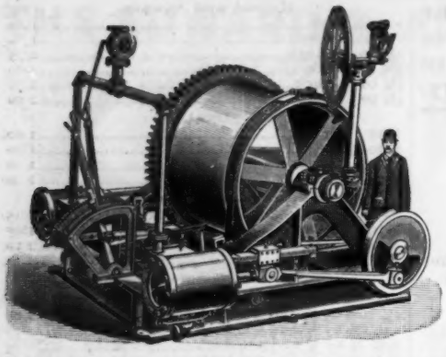
Tank	2 00
Shell	2 15
Flange	2 25
Marine Flange	2 60
Fire Box	3 70

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1 c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special

American Cast Tool Steel.

ROUND, SQUARE AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	08
9-16 to ⅞ in. "	08½



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Fixed Carbon	93.625	Ash	05.004
Volatile Matter	00.494		

Foundry, Furnace and all sizes of crushed coke. Guaranteed lower in Sulphur than any other commercial coke

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Our Prices are Just ...Right...

OAK HILL FIRE BRICK AND COAL CO.

MANUFACTURERS

OAK HILL, OHIO

7-16 to ⅜ and 2⅜ to 3 in.	.09
3⅛ to 4 in.	.09½
⅜ to 11-16 and 4⅛	.10
⅛ to 6 in.	.10½
¼ to 9-32 and 6⅛ to 7 in.	.11
7 in	.13

Flats.

	cts. lbs
2 to 9-16 in. wide by 2 to ⅝ thick	.8

Bessemer and O. H. Steel.

Bessemer Machinery	base price,	1 50
Open-hearth Tire	"	1 80
Open-hearth Spring	"	2 20
Sleigh Shoe	"	1 90
Toe Calk	"	2 10
Cutter Shoes, tapered and bent	"	2 20

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Burden Boiler Rivets.

½, ⅝, 11-16 and ¾ inches diameter	3 30
Bridge ½, ⅝, 11-16 and ¾ inch diam.	3 00

Wrought Pipe and Boiler Tubes.

Lap weld black, base	dis. 65
Butt " " "	dis. 55
Lap " galv. "	dis. 5½
Butt " " "	dis. 50
Boiler tubes 2¼" and smaller	dis 62½
Boiler tubes 2½" and larger	dis. 65
Casing screw and socket joint	dis. 52½
Casing inserted joint	dis. 47½

MACHINERY SUPPLY MARKET.

Anvils.

American	℔ 9@10
Wright's	℔ 12

Bellows.

Blacksmiths' Hill's	dis 40
Blacksmiths' Bullock's	dis 50&10
Moulders'	dis 40@40&10
Hand	dis 40&10@50

Belting.

Boston Belting Co.'s standard	dis 70
" " " extra	dis 60&5
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 45
Shultz Raw Hide Leather Belting, single,	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.,	dis 35
Buffalo	dis 40

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 30
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis
Horton's Universal	dis
" Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 40
Sweetland "	dis 40
Almond Drill	dis 20
Morse "	dis 15
Skinner's Combination Lathe	dis 40&10
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 20

Cutters and Reamers.

Cleveland	dis 10@15
Pratt & Whitney	dis 10@15
Standard	dis 10@15
Morse	dis 15
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	℔ 3½
Iron, steel points	℔ 1b 3

Drill and Drill Sockets.

Twist Drills	dis 50&10
Morse Taper and Straight Shank to 1¼"	dis 50&10
Morse Taper and Straight Shank Larger than 1¼"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 55@55&5
Cleveland " "	dis 55@55&5

Emery.

	No. 4 to No. 54 46 gr.	No. 54 to Flour, C. 150 gr.	F. FF.
Kegs, ℔	4½c	5 c	2½c
½ kegs ℔	4¾c	5¼c	2¾c
¼ kegs ℔	5 c	5½c	3 c
10 ℔ cans, 10 in case	6 c	6½c	5 c
10 ℔ cans less than 10	10 c	10 c	7½c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Grant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 55
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

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SPECIALTIES: STEEL AND IRON BUILDINGS FOR ROLLING-MILLS, TIN PLATE PLANTS, STEEL WORKS, FOUNDRIES, FACTORIES, ROOF TRUSSES, GIRDERS, COLUMNS, BEAMS, CORRUGATED IRON, ETC.

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* Daily. † Daily, except Sunday.

FROM CLEVELAND TO	LEAVE	ARRIVE
Pittsburgh and Bellaire	† 7:00 am	†12:10 pm
Salem and Pittsburg	* 8:00 am	* 8:30 pm
Pittsburgh, Bellaire and East	†12:45 pm	† 6:25 pm
Philadelphia and New York	* 1:40 pm	*11:25 am
Baltimore and Washington	* 1:40 pm	*11:25 am
Alliance and Pittsburgh	* 1:40 pm	*11:25 am
Ravenna and Alliance	† 3:25 pm	† 9:50 am
Hudson and Ravenna	* 5:00 pm	* 8:25 am
Philadelphia and New York	*11:10 pm	* 5:25 am
Baltimore and Washington	*11:10 pm	* 5:25 am
Alliance and Pittsburgh	*11:10 pm	* 5:25 am

Mt. Vernon and Pan-Handle Route

FROM CLEVELAND TO	LEAVE	ARRIVE
Xenia and Cincinnati	* 8:40 am	* 5:15 pm
Akron and Columbus	* 8:40 am	*5:15 pm
Akron, Columbus & Zanesville	12:45 pm	†12:10 pm
Akron and Orrville	† 3:25 pm	† 9.50 am
Columbus and Cincinnati	* 8:00 pm	* 6:55 am

Valley Ry.

Depot foot of So. Water St.
City Office 137 Superior St.

	Arrive.	Depart.
Akron & Canton	*6:30 P M	*7:10 A M
Akron, Canton & Valley Jctn	*10:10 A M	*3:15 P M
Valley Jctn. & Way Stations	†6:30 P M	†7:10 A M
Akron, Canton & Chicago	*8:00 A M	*6:30 P M
Wooster and Chicago	†2:45 P M	†11:00 A M
Wooster		†6:30 P M
Akron, Canton & Marietta	†2:45 P M	†11:00 A M
Steubenville, Wheeling, Washington, D. C,, and Baltimore	†2:45 P M	†11:00 A M

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Commencing with opening of navigation (about April 1st). Magnificent side-wheel steel steamers

"State of Ohio" and "State of New York."

DAILY TIME TABLE.

SUNDAY INCLUDED.

Lv. Cleveland,	6:00 P.M.	Lv. Buffalo,	6:30 P.M.
Ar. Buffalo,	7:30 A.M.	Ar. Cleveland,	7:30 A.M.

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Cheap Excursions Weekly to Niagara Falls.

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M. H. KILGALLEN, Gen'l Mgr. CHICAGO

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 25
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 50
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1887	dis 50
Heavy hammers and sledges under 5 lbs	12c
" " " " over 5 lbs	10c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4¼	4	3½	3⅛
Hexagon	15½	11¼	8½	6	5¼	5¼	
Washers	9	8	7	5	4½	4½	4⅛

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

List July 14, 1887	dis 85
Standard Penny Nails, ₩ keg card rate	
{ Car lots	$2 30
{ Less than car lots	$2.50

Oilers.

Zinc and Tin	dis 60
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&10

Picks.

Railroads, 5 to 6 lbs	$12 dis 60
" 6 to 7 lbs	$13 dis 60

Pulleys.

Iron Pulleys, Walker List	dis 50
Medart Pulleys	dis 50
Split Wood Pulleys	dis 55@60

Pulley Blocks.

Moore's Anti-Friction Differential Chain Pulley Block	dis 20

Rivets.

Iron, Thousand, list November 1, 1894	dis 60@65
Iron, Ordinary, Cooper's Block and Carriage list November 1, 1894	dis 60@65
Copper	dis 50@50&10

Saws.

Disston's Circular	dis 40&20
" Band	dis 25
" Scroll	Net
Hack Saw Stubs	dis 20
" " Eureka	pis
" " Star	dis 20
Saw Swages Diston's	dis 30
Atkins' Circular Saws	dis 40 & 40
" Mill, Mulay and Drag Saws	dis 40&10
" Wood Saws	dis 40&10
" Silver Steel Diamond Cross-cut Saws	70c per ft
" Dexter Cross-cuts	50c "
" Diamond "	30c "
" Tuttle Tooth Cross-cuts	25c "
" One-man Cross-cuts	32c "
No. 1 Handles	23c per pair
No. 6 "	16c "
Excelsior Saw Tools	$6 per doz
Derfection "	$15 "
Petroit Saw Works, Circular	dis 50
" " " Band	dis 25
" " " Mulay	dis 45

Taps.

Cards, Hand and Nut to 2 in	dis 50
Carpenters' " " "	dis 50
Morse " " "	dis 50
Pratt & Whitney " " new list	dis 10
Machine Screw Taps	dis 55
Pipe Taps to 2½ in	dis 70
Stay Bolt Taps	dis 25
Stove Bolt Taps	dis 55
Pulley Taps	dis 40

Vises.

Solid Box	dis 60
Parker's	dis 20@25
Prentiss	dis 20
Stephen's	dis 25@30
Barrett's	dis 30
Miller's Falls	dis 40
Merrill's	dis 15@20
Howard	dis 35

Wire.

New List, Apr. 9, 1894

Brass	dis 4c
Copper	dis 4c
Bright and annealed, Nos. 0@18	dis 70&10@75
" " Nos. 19@26	dis 75@75& 5
" " Nos. 27@36	dis 75&10& 5
Coppered Nos. 0 to 18, market list	dis 70@70& 5
Galvanized Nos. 0 to 18 " "	dis65& 5
Tinned market Nos. 0 to 18	dis 67½
Cast steel	dis 50
Tinned Broom Wire	dis 70&5@70&10
Annealed Fence, Nos. 8 and 9	dis 75
Annealed Grape, Nos. 10 to 14	dis 75
Stub's Steel Wire regular	95c ₩ lb dis 30

Wrenches.

Coe's genuine	dis 50
Girard Standard	dis 70&10
Agricultural	dis 75&10
Mechanic's	dis 55&10& 5
Bemis & Call's Combination	dis 35
Donohue's Engineers	dis 20&10
Lamson & Sessions Engineers	dis 60
Billings & Spencer's Drop Forged	dis 25
William's " "	dis 25
Alligator " "	dis 40

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BRONZE SCREEN PLATES To withstand action of ACIDULATED WATERS.

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For GASOLINE or OIL.

Especially adapted for DOCK and out door use, as well as for lighting manufacturing establishments, such as Rolling Mills, Foundries, Machine Shops, Engine rooms, etc., etc., being a

Convenient, Portable, Brilliant Light.

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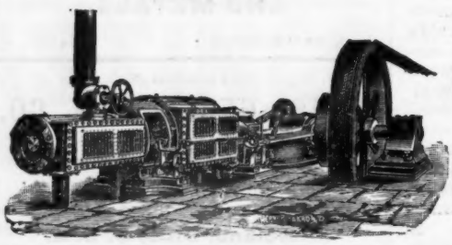
Heavy Special Machinery.



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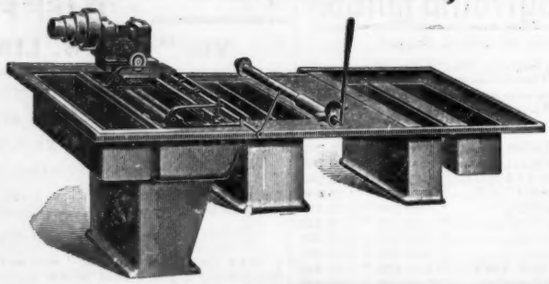
Tinning MACHINERY



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STERLING EMERY WHEEL MFG. CO. TIFFIN, O.

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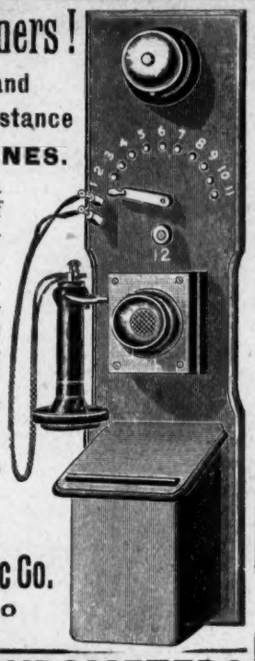

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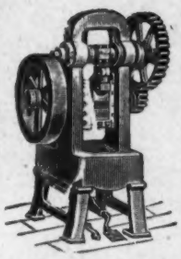

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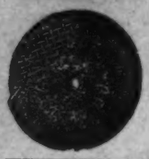

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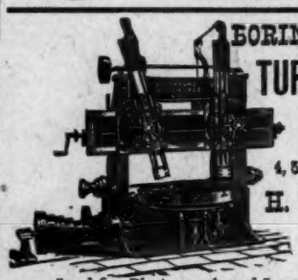

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